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TROPICAL DISEASES BUREAU.

TROPICAL VETERINARY BULLETIN.

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DISEASES DUE TO PROTOZOAN PARASITES.

CROSS (H. E.) & PATEL (P. G.). **Camel Surra.**—*Punjab Dept. Agric. Vet. Bull. No. 8 of 1922.* pp. 1–19. Lahore: Govt. Printing. 1922.

This little pamphlet is a short survey of our knowledge of camel surra, and contains certain details resulting from recent investigations.

Observations made on auto-agglutination of the red cells and leucocyte counts have not been found to give reliable results in connexion with diagnosis.

As a result of observations extending over a number of years, the authors come to the following conclusions regarding the course of the disease in camels :—

1. Infected camels if worked invariably die of the disease.

2. Camels infected when under one year, well fed and not worked do not die of surra.

3. Camels infected at six years or over die in two to six years even if well fed and not worked.

4. The duration of the disease depends upon the age at which infection takes place. Old camels die more quickly than young ones. The acute cases of surra are usually seen in camels which contract the infection when old.

Young ponies infected with camel surra frequently live for several years if not worked. Buffaloes do not die from camel surra, nor do they lose condition when infected. They may act as reservoirs, as they are a favourite host for Tabanidae.

Goats are similar to the buffalo with regard to camel surra, and they may act as a reservoir, as they are hosts of ticks which may play a part in the transmission of the disease. Sheep occupy a position similar to that of goats. Dogs are susceptible to camel surra and die within a few months.

Excellent results have been obtained in the treatment of the disease by the intravenous injection of tartar emetic in 1 per cent. solution in distilled water, injected at body temperature. The injections are given on alternate days and the dose is gradually increased from about

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50 to 200 cc. (*i.e.*, a minimum of 28 to 30 g. of the salt are given in all). The solution should be given very slowly by gravitation. Salt solution should be injected after the emetic solution to prevent its escape into the subcutaneous tissue with resulting abscess formation. It is dangerous to give injections when trypanosomes are recognizable in the blood. Any camel showing loss of appetite should not be injected for a few days. Similarly, lachrymation is an indication that injections should be suspended for a time.

The following Tabanidae have been found capable of transmitting camel surra directly: *T. nemocallosus, T. rubidus, T. hilaris* and *T. albimedius.*

The authors state that no positive results were obtained with muscids (*Philaematomyia insignis* and *Stomoxys calcitrans*).

No evidence could be obtained that any cyclical transmission occurs through the agency of Tabanidae. These were tested up to 29 days after the infecting meal. No evidence has been obtained that fleas (*Ctenocephalus felis*) can transmit surra.

Reference is made to the authors' recent discovery regarding the transmission of surra by ticks (*O. crossi*).

A brief outline of the life-history of Tabanus is given and this is followed by a tabular statement of the four chief features of Tabanus, Haematopota, Chrysops, and Pangonia.

In connexion with the measures necessary for the control of surra the suggestion is made that practical use may possibly be made of the destruction of egg-masses of Tabanidae by certain parasites (unspecified).

The authors are of the opinion that none of the dressings yet devised for the protection of camels against attacks on the part of flies is of practical value. Watery dressings are valueless as soon as they are dry, and oily dressings cause blistering. The protection afforded by sheets of light but strong material is possibly valuable and the method is worthy of trial.

BAERMANN (G.). **Die Behandlung der Surra mit "Bayer 205."** [The Treatment of Surra with "Bayer 205."]—*Beihefte z. Arch. f. Schiffs- u Trop.-Hyg.* 1922. Vol. 26. No. 2. pp. 73–123. (1–55.)

The author's investigations have been carried out in the Malay Archipelago, where surra not only causes heavy losses among horses, cattle, buffaloes and dogs, but even prevents these animals from being kept. Horses and dogs are the principal victims; the latter if well looked after recover, but remain as virus carriers. These, however, sometimes show symptoms when trypanosomes are present in their blood.

The original strain used in the experiments was obtained from a buffalo which was dying of surra.

The drug was used in 5 or 10 per cent. solution in distilled water and freshly prepared. The dose for guinea-pigs is about 0·025 g., for rabbits, 0·1–0·2 g. Sheep and goats can take 1·5 g. Healthy horses may be given 3 g. per 50 kg., but the total dose should not exceed 10 g. in any case.

If too large doses be given podo-dermatitis is produced, extensive oedema and erythema are also likely to be produced. The urine

may contain small quantities of albumen. There is at the same time marked wasting, weakness and anaemia.

Healthy animals show a varying susceptibility to " Bayer 205," but, as a general rule, the symptoms of poisoning bear a relationship to the dose administered. No evidence was obtained in the treatment of infected animals that the destruction of the trypanosomes was in any way responsible for the symptoms, as they appeared whether the drug was given during a paroxysm or during a remission.

It was noted that samples of the drug which had been kept in large bottles in the laboratory for a year and which had been frequently exposed to the air produced toxic effects in smaller doses than the fresh drug.

Although sterilization by means of a single dose is the ideal to be aimed at, certain factors, such as the duration and severity of the disease, and general condition of the animal, must be taken into consideration.

Under favourable circumstances doses of 2 to 2·5 g. per 50 kg. body-weight may be given. It is no advantage to give a small preliminary dose; such a procedure is actually inadvisable. With a view to preventing relapses doses of 1 to 1·5 g. per 50 kg. should be given two or three times at intervals of 25 to 35 days.

In severely affected animals the first dose should not exceed 1 g. per 50 kg. The subsequent doses should be smaller than those given above. The intervals between administrations should be shorter, and three or four should be given. It is disadvantageous to spread the administration of a dose over a number of days.

Horses which show more than one relapse are better destroyed.

Very few accurate observations have been made with infected cattle, but in view of the lower susceptibility of these it appears to be probable that a small dose can be used.

As a result of his experiments, which are detailed at some length in the paper, the author concludes that there is a prospect of effecting a cure in from 50 to 75 per cent. of cases.

MIGONE (L. E.) & OSUNA (T.). **Behandlung des " Mal de caderas " der Pferde mit dem neuen Mittel " Bayer 205."** [The Treatment of Mal de Caderas with " Bayer 205."]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Nov. Vol. 26. No. 10. pp. 289–304.

This paper contains an account of experiments in South America carried out with " Bayer 205 " on horses affected with mal de caderas.

In their first experiments the authors used a 10 per cent. solution made up in normal salt solution. This was injected intravenously into four animals weighing 250–300 kg. (two horses), 200 and 150 kg. respectively, and the doses were 70 and 20 cc. for the larger and smaller animals respectively.

In one of these animals there was a rise of temperature to 39.6° during the first 12 hours. The horse coughed, sought the shade and shifted its weight from leg to leg. There was sweating of the neck, flanks and groin. After 24 hours the blood showed a distinct increase in the number of lymphocytes and blood-platelets and trypanosomes had almost disappeared. After 36 hours they had disappeared completely and the temperature had fallen to 38·8°.

At 24 hours rather severe symptoms made their appearance. There was swelling of the lips, pharynx and testicles. The animal was able to move only slowly owing to pain in the joints and " swelling of the

hoofs." On the third or fourth day eczema appeared round the anus, on the nasal mucous membrane, prepuce, and a little on the glans penis. These symptoms persisted for 8 to 10 days.

The two horses which received 2 gm. each showed none of these symptoms, and a cure was effected more rapidly.

The two which had been given 7 gm. were injected after an interval of 15 days with 4 gm. without any symptoms being produced, and after a further interval of eight days with 3 gm. No untoward symptoms followed these injections. Those which had had 2 gm. originally were subsequently given 3 and 4 gm. at intervals of eight days.

The symptoms of mal de caderas entirely disappeared. One of the animals was partially blind and deaf as a result of the disease, but both of these conditions quite cleared up 10 days after the last injection. From August, 1921, when the injections were first given, until the following May guinea-pigs were inoculated every two months with blood from these horses without causing infection in any of them. In a later experiment a healthy animal was stabled next to an experimentally infected one. The healthy horse failed to contract the disease. With a view to testing the prophylactic properties of the drug it was given an intravenous injection of 2 g. and six days later 40 cc. of blood from the infected horse. The same day the infected horse was given 2 g. No trypanosomes could be found in the blood of either. Eight days later the infected animal was given a second dose of 3 g. Improvement was noticeable. A third dose of 4 g. was given six days later. The improvement continued. Subsequently repeated examinations and experimental inoculation of guinea-pigs failed to show the presence of trypanosomes in either of the horses.

The authors have applied the treatment on infected ranches, and up to the time of writing have cured 107 horses and have treated 219 prophylactically. They are of opinion that in view of the extreme advisability of establishing a diagnosis early, ranchers should learn how to use the microscope.

Intravenous injection is the best method of administering the drug, as subcutaneous injection produces inflammation.

Sound horses passing through infected areas should be injected prophylactically.

The curative doses of " 205 " are 2, 3 and 4 g. given at intervals of eight days.

The best solution to use is 10 per cent. in normal salt solution.

MIGONE (L. E.). **El Tratamiento del Mal de Caderas.** [The Treatment of Mal de Caderas.]—*Bull. Soc. Ganadera del Paraguay.* 1922. Apr. Vol. 1. pp. 124–129. [Ex. *Bull. Inst. Past.* 1922. Nov. 15. Vol. 20. No. 21. p. 860.]

Among the drugs tried by the author urotropine and " Bayer 205 " have been the most effective.

Urotropine is given intravenously in a 40 per cent. solution and the dose is 1 cc. per 10 kg. body-weight. Complete sterilization is effected, as tested by guinea-pig inoculation with 5 cc. of blood, after 12 to 14 injections.

" 205 " is given in the same manner in a 10 per cent. solution in normal saline. Three injections are given at intervals of eight days, and the doses are 2, 3 or 4 gm. of the solid according to the size of the animal.

As a prophylactic the dose of " 205 " is 2 g.

HESSELBACH (Kurt). **Die trypanozide Wirkung von " Bayer 205 " auf** *Trypanosoma equiperdum.* [The Trypanocidal Effect of " Bayer 205 " on *T. equiperdum.*]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1922. Nov. 18. Vol. 89. No. 4/5. pp. 48–71. With 1 plate & 1 text fig.

The first part of this paper, amounting to eight pages, deals with (1) a historical and zoological account of trypanosomes ; (2) a more particular account of dourine and its causal organism ; (3) the drugs which have been employed for the treatment of trypanosomiases up to the present, and the experiments which have been carried out by other investigators with " Bayer 205. "

The author then gives an account of his own experiments dealing with the effects produced by the drug *in vitro* and *in vivo*, and gives a short summary of each experiment performed.

The following is an abstract of his summary : a 1 per cent. solution of " 205 " produces little effect *in vitro*, and the effects become more marked with increased concentrations ; $7\frac{1}{2}$ per cent. solution renders trypanosomes motionless in 50–60 minutes, and a 10 per cent. solution produces a similar effect in five minutes. This is held to afford an indication of the doses advisable in treating affected animals, since in all previous experiments in the treatment of trypanosomiases it has been found necessary to give the maximum safe dose.

The first effect of " Bayer 205 " upon trypanosomes *in vivo* would appear to be one of stimulation, as is shown by the number of parasites in the first stage of division, namely, with divided blepharoplasts but the process appears to stop there, as few of these show divided nuclei.

The drug leads to a breaking up of the nucleus, its fragments being scattered throughout the cytoplasm ; subsequently the body becomes swollen, the undulating membrane and flagellum become altered and trypanolysis occurs.

In no case did a guinea-pig which was treated with " 205 " show a relapse.

Trypanosomes taken from an individual which has been treated with " 205 " some time ($3\frac{1}{2}$ hours) before may when injected into another animal set up the disease. " Bayer 205 " is said to be of value as a prophylactic.

Guinea-pigs were used throughout the experiments.

DAHMEN (H.). **Die Serodiagnostik der Beschälseuche.** [The Serum Diagnosis of Dourine.]—*Arch. f. wissen. u. prakt. Tierheilk.* 1922. Mar. 11. Vol. 47. No. 5. 319–353.

This article is so full of details regarding technique and of records of tests that as a whole it does not lend itself to abstraction. The author's conclusions may be summarized as follows :—

For complement deviation tests an alcoholic extract of trypanosomes is preferable to a watery one. The appearance of fresh clinical symptoms such as plaques is causally connected with a reduction in the amount of complement-deviating substance in the serum of horses affected with dourine.

Deviation of the complement in dourine is specific. Watery or alcoholic extracts of organs do not give positive reactions.

Agglomeration is a very useful test and in doubtful cases enables a decision to be arrived at. Agglutination in doubtful cases does not permit of a definite decision. Precipitation with watery extracts is

inferior to complement deviation. The Sachs-Georgi reaction is of no value for the diagnosis of dourine. The lipoid-fixation test is superior to the complement fixation and with trypanosome extracts is specific. The lipoid precipitation reaction is also better than the deviation of the complement test.

Generalization in dourine may be delayed until as long as eight months after infection, and antibodies only appear after generalization has occurred. Hence the necessity of a second test.

Neosalvarsan, silversalvarsan, and "Bayer 205" all give good results in the treatment of the disease, but the first two are preferable to the last on account of their lower toxicity.

The deviation of the complement test gives negative results when a case is treated successfully; on the other hand the lipoid-fixation test gives positive results in spite of treatment.

The author succeeded in transmitting the trypanosome to other horses, but not to small animals.

The foals of dourine mares do not react after the third month.

BESSEMANS (A.) & LEYNEN (E.). **Valeur antigénique de certains spirochètes et de différentes souches de trypanosomes pour le diagnostic de la Dourine chez les equidés par la réaction de Bordet-Gengou.** [The Antigenic Value of Certain Spirochaetes and Trypanosomes for the Diagnosis of Dourine by the Bordet-Gengou Test.]—*Compt. Rend. Soc. Biol.* 1922. Vol. 87. No. 28. pp. 797–800.

The spirochaetes used were *T. pallidum*, *S. icterohaemorrhagiae*, and the trypanosomes, *T. rhodesiense*, *T. lewisi*, and a bird trypanosome.

Cultures were used of all except *T. rhodesiense* and *T. lewisi*, and none of the cultivated organisms was found to be of any value.

With the trypanosomes, which were obtained from infected animals when required for antigen, specific reactions were obtained, especially with the former. The antigenic power of *rhodesiense* and *lewisi* was, however, less than that of the trypanosomes of surra, nagana, and dourine, with which the authors have previously carried out experiments. Of these three the first two have given the best results. The strains of *T. equiperdum* used were of American and Algerian origin.

The authors, in spite of numerous attempts, have not been able to isolate the trypanosome which is the cause of the disease in Belgium.

In their tests they found that the trypanosomes obtained from animals at the first crisis were superior antigenically to those obtained at subsequent crises.

SERGENT (Edm.) & DONATIEN (A.). **Transmission naturelle et expérimentale de la trypanosomiase des dromadaires par les Stomoxes.** [The Natural and Experimental Transmission of Trypanosomiasis of the Dromedary by Stomoxys.]—*Arch. Insts. Pasteur de l' Afrique du Nord.* 1922. Sept. Vol. 2. No. 3. pp. 291–315. With 1 fig.

This paper must be referred to in the original by those specially interested, as it contains details of the experiments carried out by the authors. Their conclusions, however, may be quoted as follows:—

Under natural conditions trypanosomiasis of the dromedary is transmitted in two ways: in the open country by Tabanidae, the

larvae of which swarm in the damp sand in the valleys; in inhabited parts by Stomoxys, the larvae of which live in the dung heaps in stables.

In both cases the transmission is mechanical; no cycle of development of the trypanosome has been discovered in the flies. The prolonged course of the disease in the dromedary makes the animal the reservoir of the virus.

SELMI (G.). **Azione tossica dell' estratio di** *Trypanosoma brucei* **nei giovani conigli.** [The Toxic Action of Extracts of *T. brucei* on Young Rabbits.]—*La Clin. Vet.* 1922. Oct. Vol. 45. No. 13. pp. 561–565.

After referring briefly to the work already done in connection with the demonstration of toxins liberated from trypanosomes, the author describes his own experiments.

His trypanosome extract was made by shaking a suspension of trypanosomes in normal salt solution for 24 hours with glass beads. The injections were made into the marginal vein of the ear.

Details of two experiments are given. The first rabbit received 1, 2 and 3 cc. of the suspension (1 to 20) on three successive days. The symptoms produced by each became progressively more severe, and ranged from slight depression and acceleration of respiration to prostration, muscular spasms and death two hours after injection.

The second rabbit received two injections each of 4 cc. Similar symptoms were observed and death took place an hour and a half after the second.

Examinations were made of the blood during the experiments, a number of estimations of the corpuscular content, etc., of normal rabbit blood having been made beforehand.

A table shows the results of blood counts, etc., of two rabbits injected with trypanosome extract. It would appear that these two are not those referred to in the text of the paper.

CARSON (H. H.). **Nagana and the Tartar Emetic Treatment.**—*Jl. Dept. Agric., Union of South Africa.* 1922. Sept. Vol. 5. No. 3. pp. 249–253.

After dealing with the symptoms which may be seen, the author gives details of treatment with tartar emetic.

Adult cattle may be given 1·5 g. daily on five consecutive days, and a similar dose may be used for horses, donkeys and mules. Dogs of 25 lb. body-weight may be given 0·1 to 0·125 g. The drug is dissolved in normal salt solution in the proportion of 1 g. to 20 cc. and sterilized. The intravenous method of injection is to be preferred, but extreme care must be taken to prevent any of the injection going under the skin, as this is likely to lead to abscess formation.

If an overdose be given the symptoms produced are hurried and shallow respiration, acceleration of the pulse, trembling of the muscles, sweating, and a disinclination to move.

As a routine procedure five injections are given. The condition of the animal is the best guide as to whether treatment has been successful or not. All infected and suspected animals should be isolated during the fly seasons and treated weekly.

VAN SACEGHEM (R.). *Trypanosoma theileri* **au Ruanda.** [*T. theileri* in Ruanda.]—*Ann. Soc. Belge. Méd. Trop.* 1922. Vol. 2. No. 1. pp. 113–114.

The author records the occurrence of *T. theileri* in cattle in Ruanda, and notes that it is very frequently met with. Attempts to transmit it to other animals failed. *Hippobosca rufipes*, the fly credited with the transmission of the trypanosome in South Africa, has not been observed in Ruanda.

DUKE (H. L.). **On the Zoological Status of the Polymorphic Mammalian Trypanosomes of Africa and their Relation to Man.**—*Parasitology.* 1921. Nov. Vol. 13. No. 4. pp. 352–397. With 1 text fig.

This paper is written in support of the thesis that the polymorphic trypanosomes in mammals in Africa constitute a single species which is divisible into a number of more or less distinct strains or varieties. It is, however, impossible to give a brief abstract of the evidence which the author brings forward to support the view, which is of an indirect nature.

ARCHIBALD (R. G.). *Trypanosoma rhodesiense* **in a Case of Sleeping Sickness from the Sudan.**—*Ann. Trop. Med. & Parasit.* 1922. Oct. 18. Vol. 16. No. 3. pp. 339–340.

Three cases of human trypanosomiasis were brought to Khartoum from the Sleeping Sickness Camp at Tembura, Bahr-el-Ghazal Province. To minimize the possibility of spreading the infection on the journey, each patient had two injections of 0·5 g. of atoxyl. On arrival at Khartoum trypanosomes could not be detected microscopically, but a gerbil inoculated with gland juice from a case showing enlarged glands, somnolence and slight pyrexia developed an intense infection after 66 days. Posterior nucleated forms were found. *Glossina fuscipes* and *G. morsitans* are ubiquitous in the Tembura district. Further details regarding the trypanosome are to be published later.

NAVARRO MARTIN (A.) & STEFANOPOULO (G. J.). **Action de l'aminophénolarsinate de soude (189) sur les trypanosomiases expérimentales du cobaye.** [The Action of Aminophenolarsenate of Soda (189) on Experimental Trypanosomiasis in the Guinea-Pig.]—*Ann. Inst. Pasteur.* 1922. Aug. Vol. 36. No. 8. pp. 619–623.

The results obtained by Navarro in the treatment of mice infected with *T. brucei* and *T. rhodesiense* with preparations made from pentavalent arsenic and with the sodium salt of tri-amino-tetra-oxyphenylarsenic acid have been previously reported [see this *Bulletin*, Vol. 10, p. 30]. The present experiments have been carried out upon guinea-pigs infected with *T. brucei* and *T. gambiense*.

The maximum dose of "189" tolerated by a guinea-pig by subcutaneous injection is from 0·25 to 0·3 g. per kilog.

Eighteen guinea-pigs inoculated with a strain of *T. brucei*, which generally produced a fatal result in from 20–30 days, were given varying doses of "189" between 7 and 10 days after inoculation when trypanosomes were plentiful in the blood. From these experiments it was found that the curative dose was about one third the maximum tolerated dose. If the drug is given in two small doses a degree of resistance to arsenic is developed. Of seven guinea-pigs which were

given too small doses to begin with, and which subsequently received further doses when relapses occurred, four recovered and three died.

Similar experiments were carried out with guinea-pigs infected with a strain of *T. rhodesiense*, which ordinarily proved fatal to guinea-pigs in from 30 to 40 days. The therapeutic coefficient in this case was similar to that obtained with the nagana infected guinea-pigs, namely 1 : 3·5.

When relapses occurred with *T. rhodesiense* a second dose proved to be more effective than in the case of *T. brucei*.

The injections were made with a ten per cent. solution and produced no local reaction.

CLAPIER (P.). **Premiers essais au Gabon de l'acide oxyaminophénylarsinique (Sel de Soude ou 189), dans la trypanosomiase humaine.** [First Attempts in treating Human Trypanosomiasis at Gabon with Oxyaminophenylarsenic Acid.]—*Bull. Soc. Path. Exot.* 1922. Oct. Vol. 15. No. 8. pp. 729–755.

This paper contains detailed statements regarding 21 cases treated in different ways with the drug.

The majority of the cases were treated either by subcutaneous or intramuscular injection. Good results were obtained when the cases were early ones, but in advanced cases relapses were frequent even when large doses were given repeatedly.

Only one case was treated by intravenous injection and this was under observation for about three weeks. The case was in the third phase. Trypanosomes disappeared in seven hours.

By the mouth the drug was useless.

VAN DEN BRANDEN & VAN HOOF. **Le " Trepol " ou tartro-bismuthate de potassium et de sodium dans la Trypanosomiase Humaine.** [Trepol (Tartro-bismuthate of Potassium and Sodium) in the Treatment of Human Trypanosomiasis.]—*Bull. Soc. Path. Exot.* 1922. Oct. Vol. 15. No. 8. pp. 692–693.

Three patients were put under treatment with Trepol. One of these received five doses of 0·3 g. in the course of 20 days, the second three similar doses, and the third five doses of 0·3 g.

Trypanosomes disappeared from the circulation for a short time only.

VAN DEN BRANDEN & VAN HOOF. **Essais du silbersalvarsan et du sulfarsénol dans la trypanosomiase humaine.**— *Ann. Soc. Belge de Méd. Trop.* 1922. Vol. 2. No. 1. pp. 125–130.

The authors' conclusions are that the combination of silver with salvarsan does not improve it as a trypanocide.

Sulfarsenol has some advantages over similar products from the point of view of administration, but is not superior to them therapeutically.

ARAGÃO (H. DE BEAUREPAIRE). **Transmissão da Leishmaniose no Brazil pelo** *Phlebotomus intermedius*. [The Transmission of Leishmaniasis in Brazil by *Phlebotomus intermedius*.]—*Brazil Medico.* 1922. Mar. 18. Vol. 36. No. 11. pp. 129-130. With 1 fig.

In a damp and wooded locality in Rio de Janeiro where a centre of leishmaniasis developed *Phlebotomus intermedius* was present in large

numbers. Other insects found were *Aëdes* (*Culex*) *confirmatus*, *A. taeniorhynchus* and other mosquitoes, and *Simulium pertinax*. No ticks were discovered. A dog inoculated in the nose with an emulsion of 5 *P. intermedius*, which had been fed upon a case three days previously, developed a small nodule about 3½ months later and typical leishmania were found to be present in small numbers. Flagellates resembling cultural forms of leishmania had been found in the flies.

REMLINGER (P.). **Un cas de Kala-azar infantile observé au Maroc.** [A Case of Infantile Kala Azar in Morocco.]—*Arch. Insts. Pasteur de l'Afrique du Nord.* 1921. Vol. 1. No. 3. pp. 240–241. With 1 plate.

Infantile kala azar has not been reported previously from Morocco.

LEGER (Marcel) & BÉDIER (E.). **Piroplasme du Renard d'Afrique, *Fennecus dorsalis* Gray.** [Piroplasm of the African Fox.]—*Compt. Rend. Soc. Biol.* 1922. Oct. Vol. 87. No. 29. pp. 934–935.

The parasite described is similar to one previously observed by the authors in the blood of a lion.

The majority of the organisms were rounded in shape and measured about 1·5 μ in diameter, but some were oval measuring 2 μ by 1 μ. No distinctly elongated or bacillary forms were seen, and dividing forms were scanty. Forms were observed, however, in which nuclear division had taken place; the fragments of chromatin in these were disposed in a cruciform manner, but the cytoplasm had not divided.

Smears from the liver, spleen, kidneys and lungs showed no forms other than those seen in the blood.

They place it in the genus *Nuttallia* and name it *Nuttallia bauryi*.

SACHELAIRE (V.) & JONESCU (A. L.). **Un cas de Nuttaliose.** [A Case of Nuttalliosis.]—*Archiva Veterinara.* 1922. Vol. 16. No. 3. pp. 113–118. With 1 text fig.

The horse referred to in this article was a serum producer, and had been stabled for several months. The facts of the case appear to indicate that the infection may possibly have been brought in through the medium of infected ticks in forage.

MARTIN (A.) & LASSERRE (R.). **Le "Trypanbleu" dans le traitement de la piroplasmose canine.** [Trypanblue in the Treatment of Canine Piroplasmosis.]—*Rev. Vét.* 1922. Dec. Vol. 74. No. 12. pp. 751–755.

This article contains no new information. It appears to be in the nature of a reminder to practitioners of the value of the drug. Canine piroplasmosis is said to be becoming more common, at least in the south-west of France.

NOMI (S.) & MATSUO (T.). **On the Spirochaetes in Swine.**—*Jl. Jap. Soc. Vet. Med.* 1922. Sept. Vol. 1. No. 3. pp. 140–141.

The authors record the morphological characters of spirochaetes encountered in four lesions in swine.

RAO (M. A.). *Haemogregarina canis.—Madras Vet. Jl.* 1922. July. No. 15. pp. 7–9.

The parasite was found in the polymorphonuclear leucocytes of a dog which presented the symptoms usually associated with piroplasmosis. More than 70 per cent. were invaded.

A similar organism has been found in a blood smear sent to the Madras Veterinary College. In this case also the symptoms suggested piroplasmosis.

NIESCHULZ (O.). **Über Entamöben des Hausrindes.** [The Entamoebae of the Ox.]—*Arch. f. Protist.* 1922. Oct. Vol. 45. No. 3. pp. 410–412. With 1 text fig.

The author refers to the scanty references in literature to the occurrence of entamoebae in cattle and describes the vegetative form which he found in the rumen and the mononuclear cysts which he detected in the faeces. The vegetative elements measured 5–10 microns in diameter. In living specimens there was more or less clear distinction between the endo- and ectoplasm. The rounded nucleus was distinctly double-contoured. In stained preparations a central karyosome is visible in the centre of the nucleus. Bacteria were sometimes seen in the cytoplasm. The cyclical changes seen in the karyosome of *E. histolytica* were observed in this species.

The encysted forms found in the faeces measured 5–12 microns. The cyst membrane appeared to be single-contoured, but owing to the small size of the organism it was not possible to be quite certain of this. Irregular chromidia were present in the protoplasm, and these were sometimes large. Not infrequently specimens showing large central vacuoles were observed.

Multinuclear cysts have never been seen, and in faeces several weeks old further development of the cysts has not been seen.

No proof can be furnished that the two forms observed are the same species, but it appears to be probable.

VAN NEDERVEEN (H. J.). **Infectieproef van het Rund met Konijnencoccodiën.** [The Infection of Cattle with the Rabbit Coccidium.] —*Tijdschr. v. Vergelijk. Geneesk. enz.* Leiden. 1922. Nov. 25. Vol. 8. No. 2/3. pp. 88–98. With 4 figs. [English Summary, pp. 100–101.]

Two calves were fed with sporulating rabbit coccidia, and subsequently coccidia were found in the faeces for three or four weeks only.

After an interval of three months the faeces were examined again and oocysts were found to be present in large numbers. Many of these resembled cattle coccidia in point of size, but many were present which resembled the parasite of the rabbit.

The coccidia found in naturally infected cattle could not be induced to sporulate. Those from the calves sporulated to the number of 10–25 per cent. The rabbit coccidia sporulated to the extent of 80 per cent. of those examined.

The faeces of the calves were examined in " the ordinary way " before they were fed with the rabbit parasites, and it is noted that special methods for enriching the specimens examined were not employed.

Post mortem examination of one of the calves revealed the presence of coccidiosis, and *Gastrocystis smithi* was found in the jejunum and ileum.

LYNCH (K. M.). *Tricercomonas intestinalis* **and** *Enteromonas caviae* **n. sp. and their Growth in Culture.**—*Jl. Parasit.* 1922. Sept. Vol. 9. No. 1. pp. 29–32. With 1 text fig.

Regarding the latter parasite the author states that *Enteromonas caviae* closely resembles *Enteromonas hominis* (DA FONSECA, 1915). There appear, however, to be only two anteriorly directed flagella, and the recurrent one is not adherent to the body. Encystment has not been recognized.

BLANCHARD (M.) & LEFROU (G.). **Présence de Spirochètes dans le sang d'européens atteints de fièvre bilieuse hémoglobinurique. Le problème étiologique de cette Spirochétose.** [The Presence of Spirochaetes in the Blood of Europeans affected with Biliary Haemoglobinuria. The Problem of the Etiology of this Disease.]—*Bull. Soc. Path. Exot.* 1922. Oct. Vol. 15. No. 8. pp. 699–722.

BOONE (R. C. P.). **Piroplasmose Bovine ou Hémoglobinurie infectieuse.** [Bovine Piroplasmosis or Infectious Haemoglobinuria.]—*Jl. Sta. Agron. Guadeloupe.* Pointe-à-Pitre. 1922. Vol. 2. Nos. 1 & 2. pp. 14–20 & 49–56.

HEGNER (R. W.) & BECKER (E. R.). **The Diagnosis of Intestinal Flagellates by Culture Methods.**—*Jl. Parasit.* 1922. Sept. Vol. 9. No. 1. pp. 15–23.

PERRY (H. Marrian). **Some Observations on the Occurrence of Leishmania in the Intestinal Tissues in Indian Kala-Azar, on the Pathological Changes occasioned by their Presence and their Possible Significance in this Situation.** —*Jl. Royal Army Medical Corps.* 1922. Nov. Vol. 39. No. 5. pp. 323–329.

DISEASES DUE TO METAZOAN PARASITES.

CAWSTON (F. G.). **Fresh Water Snails responsible for the Spread of Bilharzia Disease in Portuguese East Africa.**—*Jl. Trop. Med. & Hyg.* 1922. Oct. 2. Vol. 25. No. 19. pp. 305–306. With 1 text fig.

In pools in the Municipal Gardens at Lourenzo Marques (which contain the Zoo), the author found *Planorbis pfeifferi*, and these contained schistosomes resembling *Schistosomum mansoni*. *Physopsis africana* also was found to be abundant. Some of these were infested with cercariae of various kinds. A common cercaria which also occurred in a snail resembling Isidora in the same pool was longer and narrower than *S. haematobium*, and was possibly *S. bovis*.

In Natal, *P. africana* has been found infested with *S. haematobium*, *S. mansoni*, and *S. bovis*. A much smaller schistosome found in *P. africana* had flat fin-like prongs to its divided tail, and its outline resembled Bilharzia, but it was provided with black eye spots and resembled *C. oculata*, of Natal.

It is noted that patients are being treated with tartar emetic by intravenous injections. Dr. Amaral LEAL drew attention to the severe toxic effects which may be produced if the solution is boiled for long before injection.

MICELI (D.). **Valore pratico della Deviazione del Complemento applicata cella echinococcosi bovina.** [The Practical Value of the Deviation of the Complement in the Diagnosis of Echinococcus Infection in the Ox.]—*La Clin. Vet.* 1922. July. Vol. 45. No. 10. pp. 353–356.

The author concludes that the results obtained are not constant.

MACFIE (J. W. S.). **The Ascaris of Cattle.**— *Ann. Trop. Med. & Parasit.* 1922. Oct. 18. Vol. 16. No. 3. pp. 311–313. With 2 text figs.

The author has been prompted to re-examine material obtained by BEAL from a three-weeks-old calf at Kumasi in January 1921 by the publication of BOULENGER's paper "On *Ascaris vitulorum*, Goeze" (see this *Bulletin*, 1922, Vol. 10, p. 71). Macfie finds the worms similar to those described by BOULENGER (from the Punjab and Northern Rhodesia) in most respects but notes certain differences. These are briefly described. The most notable difference is the number of papillae on the posterior extremity of the male.

"The calf from which the specimens were obtained died from obstruction of the bowels, and after death Major BEAL found the worms in thousands, all intertwined, in the small and large bowels. The calf was only three weeks old at the time of its death, a fact which is of some interest in view of the possibility of pre-natal infection."

BLACKLOCK (B.) & ADLER (S.). **Pulmonary Lesions in Dogs and Cats naturally infected with Nematodes.**— *Ann. Trop. Med. & Parasit.* 1922. Oct. 18. Vol. 16. No. 3. pp. 291–292.

Pulmonary lesions were found to be present in every one of 25 dogs and five cats examined in Freetown, and took the following forms :—

1. Circular haemorrhages, 1–5 mm. in diameter, which were wedge-shaped in section. Lesions were found in dogs a fortnight old.
2. Small irregularly distributed scars.
3. Older animals showed patches of emphysema.

All the animals had either *Ancylostoma caninum* or *A. ceylanicum*, or both, and most of them had Toxascaris or Belascaris.

The number of ancylostomes in the intestines greatly exceeded the number of haemorrhages in the lungs; it is therefore probable that in the majority of cases the haemorrhages caused by larvae leaving the capillaries to enter bronchioles are absorbed without leaving any visible trace.

ADLER (S.). **Ancylostomes in Animals in Freetown.**— *Ann. Trop. Med. & Parasit.* 1922. Oct. 18. Vol. 16. No. 3. pp. 293–294. With 1 text fig.

Ancylostoma caninum was found in young dogs, but in adults both *A. caninum* and *A. ceylanicum* were present. The latter occurs at a higher level in the intestine than the former.

A. ceylanicum was found in adult domestic cats and about half of these had *A. caninum* also.

A civet cat and a genet were found to harbour *A. duodenale.* The two parasites mentioned above were found in these species. Measurements of the parasites are included in the paper.

GORDON (R. M.) & YOUNG (C. J.). **Parasites in Dogs and Cats in Amazonas.**— *Ann. Trop. Med. & Parasit.* 1922. Oct. 18. Vol. 16. No. 3. pp. 297–300.

All dogs examined contained *A. caninum* and 74 per cent. showed *A. braziliense.*

Six out of nine cats had either *A. caninum* or *A. braziliense*, or both.

GORDON (R. M.). **The Occurrence of Ancylostomes resembling *Necator americanus* amongst Domestic Pigs in Amazonas.**—*Ann. Trop. Med. & Parasit.* 1922. Oct. 18. Vol. 16. No. 3. pp. 295–296.

From ten out of fifteen domestic pigs of various ages 175 worms corresponding with *N. americanus* in all respects save size were collected. Details of sizes are given.

BOULENGER (C. L.). **On Some Nematode Parasites of the Camel in India.**—*Parasitology.* 1921. Dec. Vol. 13. No. 4. pp. 311–314. With 3 text figs.

The author establishes the occurrence of *Haemonchus longistipes* in the camel and finds that the specimens which he examined and which were thought to be *Nematodirus spathiger* were in reality *N. mauritanicus* (MAUPAS and SEURAT, 1912), which has up to the present been identified in North Africa only.

The paper contains descriptions of the two species. *H. longistipes* is distinguishable from *H. contortus* by the character of the posterior ray of the bursa, by the large size of the cloacal lip, by the length of the spicules and by the position of the barbs on the latter.

In the female the distinguishing features are the absence of linguiform process over the vulva, and the smaller size of the eggs.

UNION OF SOUTH AFRICA. DIVISION OF VETERINARY EDUCATION & RESEARCH. **The Life History of the Wire Worm of Sheep.**—*Jl. of Dept. of Agric. Union of S. Africa.* 1922. Oct. Vol. 5. No. 4. pp. 326–329.

This paper is a condensed account of the life history of *Haemonchus contortus* and includes short paragraphs upon eradication and diagnosis.

BLACKLOCK (B.) & ADLER (S.). **The Pathological Effects produced by Strongyloides in a Chimpanzee.**—*Ann. Trop. Med. & Parasit.* 1922. Oct. 18. Vol. 16. No. 3. pp. 283–288. With 1 plate & 3 text figs.

When first observed the chimpanzee was suffering from dysentery but no ova or larvae could be found in the faeces. About three weeks later it had a mild attack of diarrhoea but no blood was passed. Numerous rhabditiform larvae of strongyloides were found. Death took place about three weeks later.

The principal abnormalities found on post mortem examination were :—innumerable small recent haemorrhages scattered over the surface of the lungs, dilatation of the surface vessels of the brain, a thickening of the jejunum starting at a point twelve inches below the pylorus and extending for a distance of five inches. At the beginning of this thickening there was a conical tumour 1·5 centimetres in height projecting into the lumen of the gut. Filariform larvae were found in smears from the lungs, trachea and bronchi, in the blood in the right ventricle, pericardial fluid, liver and spleen. They measured from 0·324–0·422 mm. in length. No larvae were found in the brain.

The thickening of the jejunum was due to an increase of lymphoid tissue in the mucosa and sub-mucosa. The muscular and serous coats showed a small-celled infiltration. Innumerable adult worms were present, the majority of which were deep in the mucous membrane,

but they were also found projecting into the lumen and at the level of the circular muscular coat. Ova with developed embryos were found throughout the mucosa.

The tumour comprised a core of muscular tissue surrounded by a thick layer of lymphoid tissue extending up to the muscularis mucosae. Adult strongyloides and larvae were found throughout the alimentary tract. The adults measured 1·8–2·5 mm.

BOULENGER (C. L.). **Strongyloid Parasites of Horses in the Punjab.**— *Parasitology*. 1921. Nov. Vol. 13. No. 4. pp. 315–326. With 5 text figs.

The author refers to and describes where necessary 21 species of strongyloid parasites of horses in the Punjab. None of the species are new. They belong to the genera Strongylus, Oesophagodontus, Triodontophorus, Poteriostomum, Cylicostomum.

LANE (C.). **A Preliminary Note on Two Strongylata from Swine in the Pacific.**—*Ann. & Mag. Nat. Hist.* 1922. June. Ser. 9. Vol. 9. p. 683.

The author describes two new species of nematodes obtained from O'CONNOR (F. W.). They are *Globocephalus connorfilii* and *Crassisoma samoense*. Only morphological details are described.

DRABBLE (J.). **The Kidney Worm of Hogs in New South Wales,** *Sclerostomum renium*, **n. sp.**—*Jl. Comp. Path. & Therap.* 1922. Dec. Vol. 35. No. 4. pp. 302–305. With 1 text fig.

The kidney worm of the pig in New South Wales, which is fairly frequently met with, has hitherto been mistaken for *Stephanurus dentatus* (*Sclerostoma pinguicola*).

The author describes the characters of the parasite and concludes that it is a new species.

Males measure 25–40 mm. and females 30–54 mm. The posterior extremity of the female is curved ventrally and behind the anus narrows to a spike-like tail. Just in front of the anus, on either side is a knob-like projection of cuticle directed outwards. The vulva is a little in front of the anus and slightly prominent. In the male there are two spicules of equal length. The bursa has a regular ray system ; the dorsal ray divides into two main branches each of which is bifurcated.

Further details of morphology, etc., are promised. Observation has shown that this parasite is becoming increasingly common in young pigs.

The parasites are usually found in diverticula of the ureters, and commonly in the pelvis of the kidney, kidney fat and liver. Less frequently they invade the kidney tissues and sublumbar muscles. As a rule several worms are found together surrounded by a variable quantity of greenish pus.

Hydronephrosis is frequently produced. In an advanced case the kidney may be represented by a fibrous sac, the walls of which contain nodules of about 1 centimetre diameter. These are nests of worms.

The liver lesions rarely contain pus, but are composed of fibrous tissue which is less dense in the centre where there is a small cavity containing a worm or worms which are frequently immature.

Usually no symptoms are observed during life, but in a severe case there may be paraplegia.

LEGER (M.) & BAURY (A.). **Microfilaire sanguicole du Renard africain *Fennecus dorsalis* Gray.** [A Microfilaria from the Blood of an African Fox.]—*Compt. Rend. Soc. Biol.* 1922. Oct. Vol. 87. No. 29. pp. 936–937.

In the living state the worm was capable of very active movements and travelled about freely in the moist blood film. No sheath was recognizable.

In preparations stained by Romanowsky, the parasite measured 200–210 μ by 4·5–5 μ. The clear area at the cephalic end varied from 5–10 μ. There appeared to be three spots constant. The two anterior ones were placed 45–60 μ from the head, while the third, which was rather less pronounced, was about 165 μ from the anterior end. The " central viscus " of MANSON was clearly visible slightly posterior to the middle and measured about 20 μ. The cuticle was finely striated and sometimes a kind of canal opening at a lateral pore could be made out.

No adults were found in the peritoneal cavity.

GABRIELIDES (A.) & GUIART (J.). **La Myose oculaire à " *Oestrus ovis* " à Constantinople.**—*Bull. Acad. Méd. Paris.* 1922. Feb. 28. Vol. 87. No. 9. pp. 253–255.

A case is quoted in which 14 first-instar larvae of *Oestrus ovis* were extracted from the eye of a shepherd.

MUNRO (H. K.). **The Sheep Blow Fly in South Africa.**—Union of South Africa. *Jl. Dept. Agric.* 1922. Nov. Vol. 5. No. 5. pp. 449–456. With 6 text figs.

The scattered references in the literature appear to indicate that blow-flies have been noted as a pest of sheep in South Africa during the past 20 years only, and until recently practically nothing has been done in the way of investigation in South Africa. The bulk of knowledge regarding the flies is the result of Australian investigations. Three species are known in South Africa, *Pycnosoma chloropyga*, Wied., *Pycnosoma albiceps*, Wied., and *Lucilia sericata*, Meig. The first two have a wide distribution in Asia and Africa and the last is a common blow-fly of other countries.

No definite reason can be assigned as to why these flies should take to blowing the wool of sheep as they ordinarily breed in carrion. Possibly it may be due to a natural tendency to change from dead to living food.

Up to the present the two species of *Pycnosoma* have been bred from wool in the coastal region (up to 100 miles from the coast). There appear, however, to be two sub-regions in this belt. Within 10 miles of the sea the flies show little or no tendency to blow wool, but it is said that if sheep are taken 60 miles inland they become blown at once. A possible explanation of this is that sheep purge more inland than near the sea, the fleece becoming more soiled, and possibly more attractive to the flies in consequence. Possibly some climatic condition affects the bionomics of the fly and accounts for the difference. Lucilia has been bred in large numbers from wool from the Free State only.

The appearance of two fly seasons, October and January, may be due to the fact that the fleeces are long at these times and the flies are more troublesome when the wool is long than when it is short. The flies do not disappear between these periods.

Although the matter is a little intricate it has been found possible to identify flies by their maggots.

Details are given of the general morphology of the maggots, and also of the mature flies. There is included a description of *Sarcophaga haemorrhoidalis* (the Grey Flesh Fly) the common blow-fly of meat, which has not been as yet obtained from wool.

QUEENSLAND AGRICULTURAL JOURNAL. 1922. Aug. Vol. 18. No. 2. pp. 102–104. **Report of the Blowfly Committee of the Institute of Science and Industry. Protection of Sheep from Blowflies. II.**

This report contains a description of an effective method of protecting sheep against blow-flies, the essence of which is the saturation of the wool round the breech with a solution of arsenic, the saturation being effected by forcing the solution through a small jet at high pressure.

A solution of commercial white arsenic in soda ash of 0·7 per cent. strength (ascertained by analysis) gave sufficient protection, but solutions of twice that strength were used without ill effects. A single "jetting," as it is called, with this solution gives protection (save in wet weather) for three months. Six weeks protection is the shortest noted.

The machine used is a pump capable of delivering solution under a constant pressure of 60–200 lb. per square inch. The jet is one-sixteenth of an inch, but for dense fleeced sheep three-thirty-seconds is better. A pint and a half is sufficient for a sheep. With a suitably constructed race four men can deal with 3,000 sheep per day.

ROUBAUD (E.). **Les mouches "tsétsés" et les conditions de l'elevage en Afrique Occidentale Française.** [The Tsetse Flies of French West Africa and the Conditions of Cattle Breeding there.]—*Agron. Colon.*, Paris. 1922. July & August. Nos. 55 & 56. pp. 217–223 & 254–262. With 2 plates, 5 text figs., and 1 map. [Ex. *Rev. App. Entomol.* 1922. Nov. Vol. 10. Ser. B. No. 2. pp. 212–214.]

The distribution of Glossina is one of the factors controlling the breeding of cattle in French West Africa The northern areas are more or less safe for herds because of the dry winds blowing from the Sahara. The flies are limited to the more humid areas and in consequence are to be found in the southern portions of the country where the winds from the Sahara are not felt. The cattle-raising areas account for about one-fifth of the whole country. It is noticeable that herds are smaller and are composed of animals of smaller size as one passes southwards. The cattle outside the fly belts are of the large humped type, and are particularly susceptible to trypanosomiasis. Only the large animals are fit for export. The smaller animals of the southern herds are, however, frequently used for transport purposes. They are the only domestic animals which can exist in the zones infested by *G. morsitans*. In two cases successful experiments have been made in importing into other fly infested areas the small trypanosome resistant half wild cattle of the sea and lake coast areas.

Conditions similar to those obtaining among cattle are found among the horses of the territory. Generally their susceptibility to trypanosomiasis is directly proportional to their size. In mid-Dahomey

there is a dwarf race which is the most resistant. The suggestion is made that this race might be used with advantage for the production of mules, for while donkeys cannot be raised in the Glossina belts mules show a greater degree of resistance. Algerian mules have not the resistance of those bred locally.

The larger races of sheep and goats cannot live in the fly areas, and it appears to be probable that the smaller races in the fly zones owe their freedom from trypanosomiasis more to the fact that they live almost entirely within villages where they are protected from flies than to natural resistance.

Pigs appear to be the least susceptible of the domestic animals to trypanosomiasis, but Mahommedan prejudices prevent their rearing in any numbers.

ROUBAUD (E.). **Les mouches tsétsés dans l'Ouest Africain. Distribution géographique—Histoire—Rôle pathogène** (à suivre). [The Tsetse Flies of West Africa—Geographical Distribution, History, and Pathogenicity. (To be continued.)]—*Ann. Inst. Pasteur.* 1922. Oct. Vol. 36. No. 10. pp. 720–728. With 1 map.

A paper of this nature does not lend itself to abstraction and must be consulted in the original by those interested.

PARROT (L.). **Présence de** *Phlebotomus perniciosus* **Newstead dans la region parisienne.** [The Presence of *Phlebotomus perniciosus*, Newstead, in the Neighbourhood of Paris.]—*Bull. Soc. Path. Exot.* 1922. Oct. Vol. 15. No. 8. p. 694.

The author records the occurrence (one specimen caught) of this fly west of Paris.

CHEYSSIAL (M. A.). **Experimentation de la Methode de d'Herelle en Guinée française pour la destruction des Acridiens.** [The Application of d'Herelle's Method for the Destruction of Locusts in French Guinea.]—*Bull. Soc. Path. Exot.* 1922. Oct. Vol. 15. No. 8. pp. 762–764.

The original culture used was furnished by D'HERELLE and was labelled "Coccobac. acridiorum, Souche V. Yucatan."

The virulence of the culture was exalted by passages through locusts until it was capable of causing death in from 10–12 hours. It was then alternately passed through locusts and broth cultures and after 20 passages diarrhoea was produced in three hours and death in eight.

The first experiment was carried out in the hospital grounds at Ballay with the result that, in spite of a hurricane of wind and a fall of more than an inch of rain, complete destruction of locusts resulted. The mortality spread to other grounds outside the hospital which were also cleared of the insects.

Successful experiments were also carried out in a number of other places.

It was observed that ants' nests were not affected.

The type of locust concerned in the experiments has not been determined definitely but it is probably *Stauronautus marocanus* or *caloptenus*. The wings of this species are not adapted to flying.

A short account of the life history and habits of the locust are included in the paper.

DAWE (M. T.). **Efwatakala Grass** (*Melinis minutiflora*) **as a Means for the Control of the Tsetse Fly.**—*Tropical Life.* 1922. May. Vol. 18. No. 5. pp. 69–71. With 1 fig.

This grass has a strong odour which might act as a repellent to the flies, and further, the leaves are covered with glandular hairs which contain a viscid oil which it is thought is objectionable to some insects. It is belief in this property which leads to the use of the grass as bedding for animals. The grass is largely used in South America for grazing cattle, and it is said that ticks cannot live in it. It is believed that cattle moved from such grazing are not attacked by ticks for some time afterwards. It is also thought that the fly producing cattle warbles there is disappearing with the extended cultivation of the grass.

The grass grows easily and rapidly on moist or dry soil, and occurs over a wide area in Africa which extends from the South of the Sahara to Natal.

CUNLIFFE (N.) & NUTTALL (G. H. F.). **Some Observations on the Biology and Structure of** *Ornithodorus moubata.* **(Murray.)**—*Parasit.* 1921. Nov. Vol. 13. No. 4. pp. 327–347. With 1 plate & 5 text figs.

GORDON (R. M.) & EVANS (A. M.). **Mosquitoes collected in the Manáos Region of the Amazon.**—*Ann. Trop. Med. & Parasit.* 1922. Oct. 18. Vol. 16. No. 3. pp. 315–338. With 1 plate & 10 text figs.

GOBERLET (J. E.). **Three New Species of Holostomidae.**—*Jl. Parasit.* 1922. Sept. Vol. 9. No. 1. pp. 7–13. With 2 plates.

GREIG (D. M.). **Myiasis oestrosa: Being the Occurrence in the Human Subject of the Larva of** *Hypoderma bovis.*—*Edinburgh Med. Jl.* 1922. June. Vol 28. No. 6. pp. 258–266.

INGRAM (A.) & MACFIE (J. W. S.). **West African Ceratopogoninae. Part II.**—*Ann. Trop. Med. & Parasit.* 1922. Oct. 18. Vol. 16. No. 3. pp. 243–282. With 24 text figs.

MAPLESTONE (P. A.). **Notes on Australian Cestodes. VI.** *Schizotaenia cacatuae,* **sp. nov.**—*Ann. Trop. Med. & Parasit.* 1922. Oct. 18. Vol. 16. No. 3. pp. 305–310. With 5 text figs.

POMMÉ & SABAGH (A.-K.). **Un cas de Bilharziose vésicale à Damas traité par l'antimoine en injections intraveineuses.** [A Case of Vesicular Bilharziosis at Damas treated by Intravenous Injections of Antimony.]—*Bull. Soc. Path. Exot.* 1922. Oct. Vol. 15. No. 8. pp. 695–698.

RODHAIN (J.). **Sur une Filaire parasitant le tissu conjunctif sous-cutané de** *Agama colonorum* **Dunv. et Bibi au Congo Belge.** [A Parasitic Filaria of the Subcutaneous Connective tissue of *Agama colonorum* in the Belgian Congo.]—*C.R. Soc. Biol.* 1922. July–Sept. Vol. 87. No. 28. pp. 807–810. With 1 text fig.

URICH (F. W.), SCOTT (H.), & WATERSTON (J.). **Note on the Dipterous Bat Parasite,** *Cyclopodia greeffi* **Karsch, and on a New Species of Hymenopterous (Chalcid) Parasite bred from it.**—*Proc. Zool. Soc., London.* 1922. June. No. 2. pp. 471–477. With 1 fig.

BACTERIAL DISEASES

VAN SACEGHEM (R.). **La pneumonie contagieuse des chèvres au Ruanda.** [Contagious Pneumonia of Goats in Ruanda.]—*Ann. Soc. Belge. Méd. Trop.* 1922. Vol. 2. No. 1. pp. 121–124.

According to the author the method of infection is by ingestion of contaminated food or water. Enteritis is sometimes a complication.

He has isolated a coccobacillus, with which he has transmitted the disease experimentally. The cultural characters are described. The organism differs from the Pasteurella described by HUTYRA and MAREK as the cause of contagious pneumonia of the goat in that it is motile, and van Saceghem classes it as a Salmonella. Cultures retain their vitality for months, but lose virulence.

With cultures of different degrees of virulence a peracute, acute, and chronic form of the disease have been produced.

Sheep are non-susceptible.

DONATIEN (A.). **El Ghedda. Septicémie hémorrhagique des dromadaires.** [El Ghedda. Haemorrhagic Septicaemia of the Dromedary.]—*Arch. Insts. Pasteur de l'Afrique du Nord.* 1921. Vol. 1. No. 3. pp. 242–249.

The outbreak described occurred among the camels of a tribe of nomads and the mortality was nearly 50 per cent.

The onset was sudden and there was marked fever, lachrymation, complete loss of appetite and arrest of rumination. There was almost invariably enlargement and inflammation of the prepectoral glands. Not infrequently these glands suppurated and discharged pus.

In some cases there was profuse diarrhoea of a black colour. Abortion almost invariably occurred. This was looked upon as a good sign by the owners. Rising and moving when up were obviously accompanied by pain. In fatal cases death occurred in from 2–8 days, but it was exceptional to see a case actually terminate fatally, because animals which appeared to be likely to die were killed for food.

In cases which recovered convalescence was prolonged.

At the post-mortem the lesions found vary with the case. The muscles are discoloured and friable, this being particularly the case with the heart, and haemorrhages are found in all parts of the muscular tissues. As a rule only one of the prepectoral glands is involved. Various stages of the gland lesion may be encountered. The earliest phase is the presence of ecchymoses. In later phases the whole surface of the gland is red, and still later points of suppuration are observed. Finally the whole gland may be converted into pus. None of the other body glands was observed to show suppuration, although they presented evidence of acute haemorrhagic adenitis.

In the abdomen the constant lesion is found in the liver. This shows evidence of degeneration, and histological examination shows that the type of lesion present is variable.

In cases which have shown black diarrhoea there is intense enteritis of the small intestine. The spleen appears to be normal. There is an excess of clear fluid in the peritoneum. As a rule there are no lesions in the thoracic cavity, but in one case there was acute pneumonia along the lower border of the lungs, the lesion showing a tendency to suppuration. The bronchial and mediastinal glands in this case were

suppurating. Histological examination revealed the presence of small "toxi-infectious" nodules composed of about a score of cells in the liver lobules, granulo-fatty degeneration of the liver cells, and later the cells in the centre of the lobules are found to have lost their plasma, and the nuclei are pycnotic.

The disease appeared to favour the spread of mange among convalescents.

Under natural conditions only camels are attacked, but certain races of animals, *e.g.*, the Saharan and the Tell camels, appear to be resistant.

Trypanosoma berberum was never found. Attempts to infect guinea-pigs failed, as did also rabbit inoculations.

A young camel (Chaamba tribe) failed to respond in any way to a subcutaneous inoculation with material from a suppurating prepectoral gland and to the administration per os of 100 cc. of urine from a diseased animal.

A small bacillus was isolated from the gland material used, but no evidence of its virulence by inoculation or of its connection with the disease by agglutination could be established.

DONATIEN (A.) & LARRIEU (M.). **Nouvelle epizootie de Ghedda à M'Raier (Sahara) en 1921.** [A New Outbreak of Ghedda (Haemorrhagic Septicaemia of Dromedaries) at M'Raier (Sahara) in 1921.] —*Arch. Insts. Pasteur de l'Afrique du Nord.* 1922. Sept. Vol. 2. No. 3. pp. 316–319.

In this outbreak about 10 per cent. of the total number (1,800) were attacked, and of these 63 died. Death took place on the 5th or 6th day after the first rise of temperature.

The symptoms presented were very few. There was a rise of temperature, loss of appetite, cessation of rumination and constipation. In some cases there was enlargement of the prepectoral and superficial inguinal glands.

Contrary to what one of the authors observed in an earlier outbreak, recovery when it occurred was very rapid.

The lesions in fatal cases may be severe or slight. The lesions were those of a haemorrhagic septicaemia, but particular mention is made of haemorrhagic nephritis. The muscles and glands showed the lesions described in the previous paper on the subject.

The difference in the severity and mortality of the two outbreaks is put down to the different condition of the animals. In the earlier outbreak the dromedaries were in a condition of poverty.

Attempts were again made to isolate the causal organism, but without success.

CRAIG (J. F.) & KEHOE (D.). **An Outbreak of Contagious Abortion in an Irish Dairy Herd.**—*Jl. Comp. Path. & Therap.* 1922. Dec. Vol. 35. No. 4. pp. 256–273.

This paper contains an account of an Irish dairy herd of some 30 animals in which contagious abortion made its appearance, and the observations made following the application of live vaccine. The herd being a utility herd, the whole of the animals were not under observation for the entire period of three years during which the observations were made. Only 10 of the original animals remained at the end of the period.

It was not practicable to have controls in a case of this kind, but in view of the fact that no abortions occurred in the herd after vaccination,

the authors conclude that a marked degree of immunity was established. With regard to sterility the authors think that some of the animals were benefited by the vaccination, while in others the reverse was the case.

The immunity appeared to last for two years and then broke down in some of the original members of the herd. They advise that in herds which have been vaccinated the vaccination should be repeated annually. The authors do not think there is much risk of creating carriers by using living vaccine, and they imply that the vaccine is less virulent than the organisms which are responsible for natural infection. The value of the agglutination test for the diagnosis of the disease is confirmed, but it is noted that while a positive result is almost invariably obtained before abortion occurs, there are occasional cases in which abortion precedes the development of agglutinins in the blood.

Confirmation is also forthcoming of the fact that once a cow has become infected the infection may persist for years.

The defects of the method of vaccinating are discussed. The first is the impossibility of immediately applying vaccination to a whole herd when the disease makes its appearance, it being unsafe to inject in-calf animals. The second is that by vaccination the disease is not eradicated. It is the effects of the disease, and not the disease itself, which are controlled.

BEVAN (Ll. E. W.). **The History, Control, and Treatment of Infectious Abortion of Cattle.**—*Rhodesia Agric. Jl.* 1922. Oct. Vol. 19. No. 5. pp. 554–568.

The principal interest of this paper lies in the author's discussion of the question of vaccines, but owing to the controversial nature of the subject it cannot be abstracted satisfactorily. The "devitalized" vaccine, which the author prepares and uses in the field, is considered in the light of more recent statements from other countries, and notably from the United States, and the conclusion arrived at is that, while the method is somewhat empirical, it has yielded results which warrant its use, pending further investigation, in preference to living vaccine.

GILTNER (W.), HUDDLESON (I. F.) & TWEED (R. L.). **The Role of the Udder and its Secretion in Bovine Infectious Abortion.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Nov. Vol. 62. No. 2. pp. 172–178.

This paper is a review of existing knowledge on the subject, and the substance of the authors' summarization of this is as follows: there is no positive evidence to warrant the assertion that milk from an udder containing *B. abortus* is an important factor in the spread of the disease. Animals which carry the organism in their udders and which do not abort are probably the important source of infections, as such animals have been found repeatedly to pass out the organisms in uterine exudates during parturition.

The paper includes a valuable bibliography.

COTTON (W. E.). **The Character and Possible Significance of the Bang Abortion Bacillus that attacks Swine.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Nov. Vol. 62. No. 2. pp. 179–192.

The author describes in general terms the results obtained from the examination of six different strains of *B. abortus* causing abortion in pigs, and comes to the conclusion that these while resembling each other

more or less closely differ markedly from all the strains which have been isolated from cattle. One of the most important differences is in the pathogenicity for the guinea-pig. Bovine strains appear to be incapable of producing distinct or even recognizable microscopic lesions in that species, while strains isolated from pigs possess marked pathogenic properties. The six pig strains examined varied among themselves with regard to the severity of the lesions produced and the frequency with which certain of them appeared, but there was a general agreement between all of them. Lesions in the bones and orbits, the latter causing protrusion of the eyeball and destruction of sight, are of frequent occurrence when pig strains are used.

Feeding experiments with swine indicated that passage through guinea-pigs lowered the virulence for the sow, but that passage through the pig again restored it.

Many attempts have been made to infect pregnant sows by feeding them with strains of abortion bacilli of bovine origin, but these have invariably failed.

A small number of experiments are recorded in which pregnant cattle were inoculated with the swine strain. It was not possible to obtain evidence of infection in all cases.

Experiments are being carried out with a view to ascertaining whether swine strains are capable of causing abortion in herds which have acquired immunity against the ordinary cattle strains. The work is not yet complete, but results obtained appear to indicate that a recrudescence of abortion may occur.

Lasting infection of boars was only produced by direct inoculation into the testicles. Boars so inoculated allowed to run with sows failed to infect the latter as they farrowed normally and their blood was negative to the agglutination test.

HAGAN (W. A.). **Studies on the Disease of Guinea-pigs due to *Bacillus abortus*.**—*Jl. Exp. Med.* 1922. Dec. Vol. 36. No. 6. pp. 697–709.

The experiments recorded in this paper were carried out with a strain of bovine origin less than six months previously In experiments designed to ascertain the minimum infecting dose it was found that 100 bacilli were sufficient to infect in the great majority of cases. Occasionally guinea-pigs with an abnormally high degree of resistance were encountered. The dose administered did not appear to affect the final result of the inoculation, but with small doses the infection took a slower course.

The majority of the guinea-pigs were not kept under observation for more than six months, but judging from the results of agglutination and the results of culture experiments at the end of that period, it would appear that the infection tends to die out.

Charts are given showing variations of virulence encountered as a result of passage through guinea-pigs.

Although many guinea-pigs, infected and normal, were kept together in large pens during the course of the experiments, in no case was natural infection contracted. But in one case where a male was placed with infected females it became infected, yielded positive agglutination tests and its spleen and epididymis yielded cultures. One of the females was found to have an abortion abscess in its uterus with discharge passing into the lumen of the organ.

It was computed that the dose necessary to infect guinea-pigs by ingestion was 100 million times the dose necessary by inoculation.

HAGAN (W. A.). **The Value of Heat-Killed Cultures for the Prevention of the *Bacillus abortus* Inoculation Disease of Guinea-pigs.**—*Jl. Exp. Med.* 1922. Dec. 1. Vol. 36. No. 6. pp. 711–725. With 4 text figs.

These experiments were undertaken with a view to studying the mechanism of immunity in this disease, it being possible with this species to avoid the complexities of the subject in connection with cattle abortion. The danger of inferring from one species to another is recognized.

In view of the results of previous work on similar lines and of investigations in connection with the natural disease of cattle the experiments were planned on a quantitative basis in an effort to detect immune processes which might not be sufficient to afford complete protection. The factors taken into consideration in judging results were (*a*) changes in body-weight; (*b*) differences in agglutinin curves; (*c*) extent and character of the lesions, particularly in the spleen; and (*d*) the number of abortion bacilli cultivable from the spleen.

The culture used was a typical bovine strain isolated by guinea-pig inoculation. The age of the culture is not given, but it is stated that it grew readily on plain veal infusion agar "provided the cultures were hermetically sealed."

Twelve guinea-pigs of similar size and age (females) were given weekly 1 cc. of a suspension of killed bacilli intraperitoneally. This was continued for six weeks. Three weeks later, when the agglutination titres began to fall they (two being excluded as controls), along with ten uninjected females of similar weight and age, were inoculated intraperitoneally with definite dilutions of a culture of the same strain as that used for the immunizations. The animals were bled regularly at intervals of a week and agglutination tests made. They were killed in groups at three, six, nine, and twelve weeks.

It was noted that the non-immunized animals showed greater increases in weight than the immunized ones before the infecting doses were given, but that after infection the position was reversed. On the total experiment the gain in weight of the two groups was about the same. Two guinea-pigs kept along with the others received neither immunizing nor infecting doses, and these acted as controls. These animals showed a markedly greater increase in weight than any of the others.

Agglutination tests showed that in this respect there was practically no difference between the two groups in response to the infecting dose. The size of the infecting dose made little difference to the response.

All the guinea-pigs became infected, showing that the treatment failed to prevent the disease. It was noted that the enlargement of the spleen was almost invariably much greater in the non-immunized group, and it appeared that this was referable to a delay only in the process of development of the lesions, not to any inherent difference in their nature, Enlargement of the glands was also more marked in the non-immunized than in the immunized.

A striking lesion occurring in the non-immunized animals was that previously described by SMITH and FABYAN, viz., cellular infiltration followed by sclerosis.

An appreciably larger number of bacilli were present in the spleens of non-immunized animals as compared with the immunized.

The conclusions are that guinea-pigs cannot be rendered immune by means of cultures killed by heat, but that the progress of the disease may be delayed by such treatment.

In an appendix the technique of the method used for the agglutination tests and the method of determining the number of bacilli in the spleen are given.

In connection with the former it is stated that carbolic acid was not used as preservative for the antigen, as it "induces a permanent cloudiness of the suspension, which renders the reading of partial reactions difficult."

HAGAN (W. A.). **The Susceptibility of Mice and Rats to Infection with** *Bacillus abortus*.—*Jl. Exp. Med.* 1922. Dec. 1. Vol. 36. No. 6. pp. 727–733.

Previous experiments have been carried out on these lines, but with rather large doses. The present work has been done with a view to providing answers to the questions as to whether rats and mice are sufficiently susceptible to small doses to be of value for diagnostic purposes and whether wild rats are sufficiently susceptible to infection by ingestion to make them a possible factor in the transmission of the disease among cattle.

Mice were inoculated in pairs with decreasing doses of a definite emulsion and the results indicated, as shown by cultivations from the spleen, that mice compare favourably with guinea-pigs in susceptibility to inoculation. The suggestion is made that they may serve as an inexpensive substitute for guinea-pigs in diagnostic work. Attempts were made to infect white and grey rats and white and grey mice by feeding, either with cultures or with infected organs. All attempts failed with the exception of two. One white and one grey rat became infected as a result of ingesting a large amount of culture.

VINCENT (H.). **Sur la prophylaxie de la fièvre ondulante (fièvre de Malte ou méditerranéenne).** [Prophylaxis against Undulant (or Malta) Fever.]—*Rec. Méd. Vét.* 1922. Oct. 15. Vol. 98. No. 19. pp. 557–563.

With a vaccine containing fourteen strains of *M. melitensis* and two of *M. paramelitensis* the author has been able to confer immunity upon a number of goats. The protected goats were tested by intravenous inoculations. No details of the preparation, etc., of the vaccine are given.

The method has been used in practice in about 200 cases. The only evidence of reaction to the vaccine is a rise of temperature (sometimes accompanied by diarrhoea) a few hours later.

SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH. **Annual Report for the Year ended Dec. 31, 1921.** 1922. Johannesburg.

Undulant Fever.—Ten positive agglutinations were obtained. The localities from which the sera came were as follows: Graff-Reinet, Calitzdorp, Kimberley (2), Johannesburg (2), Kuruman, Hopetown, Potchefstroom, and Shabani.

OKUDA (K.). **On a Soluble Toxin produced by** *Bacillus chauvoei*. —*Jl. Jap. Soc. Vet. Med.* 1922. Sept. Vol. 1. No. 3. pp. 198–199.

The author grew the bacillus in broth containing 10 to 20 per cent. of fresh blood (of any kind). The toxin content reaches its maximum

in two to four days, but it then declines. The addition of 0·5 per cent. of anhydrous sodium sulphite to the broth increased yield of toxin. 0·1 cc. of filtrate was sufficient to cause death in guinea-pigs. The symptoms shown were coughing, dyspnoea and suffocation. Post-mortem examination revealed haemorrhages in the subcutaneous tissue, muscles, lungs, serous membranes and blood stained exudates in the serous cavities. Animals which survived were resistant to subcutaneous inoculation with culture, but this immunity was less strong than that produced by the subcutaneous injection of toxin.

FUTAMURA (H.). **Studies on Bovine Influenza.**— *Jl. Jap. Soc. Vet. Sci.* 1922. Sept. Vol. 1. No. 3. pp. 133–140. With 1 plate.

Although this disease may be seen at all seasons of the year, it is usually more prevalent during late winter and early spring. Animals of all ages and breeds are attacked, but it is more fatal in calves than in adults.

The initial symptoms are those of an acute fever, and the temperature rises until the second or third day and then falls. Catarrhal conjunctivitis is very constant, as is also a nasal discharge which becomes muco-purulent. Salivation is marked and the saliva is stringy. Occasionally blood is mixed with the diarrhoeic faeces.

In pregnant cows from the fifth month abortion is certain to occur. In milking cattle the milk supply is reduced to a half or even ceases altogether. Bulls become incapable of effecting coitus. The incidence in a herd may be up to 50 per cent., but is usually lower than that. The mortality from the disease is about 3 per cent., but sometimes animals have to be destroyed on account of sequels to the disease.

The principal lesions are gelatinous oedema in various parts of the body, hepatization of the lungs, engorgement of the liver and kidneys, and congestion of the alimentary mucous membrane. The spleen is not affected.

According to the records inoculation of calves with materials from animals dead of the disease has failed to produce it, but a bipolar organism has been isolated from a number of tissues, which it is considered may be the cause of the condition.

Mice and rabbits were susceptible to infection with this organism, but it was non-pathogenic for guinea-pigs and pigeons. Sheep and cattle could be infected. The former died within 12–36 hours without developing definite symptoms. In two cases calves developed symptoms but recovered, and in a third, which was inoculated intravenously, typical symptoms were developed and death took place.

A feeding experiment with a cow resulted only in loss of appetite with a slight rise of temperature followed by recovery.

Agglutination and complement fixation tests indicated the presence of antibodies in the serum.

Serum from a hyperimmunized ox yielded irregular results in the treatment of the disease.

JONESCU (A. P.). **Un cas de Charbon chez le chien.** [A Case of Anthrax in a Dog.]— *Arch. Veterinara.* 1922. Vol. 16. No. 4. pp. 168–172.

The dog referred to in this article was one of a series of animals infected from the same source, namely, an ox which had died of anthrax. The owner of the animal developed malignant pustule, a pig became ill and was killed, and a sheep also died.

A definite diagnosis was arrived at in the case of the man only, apart from the dog. While no definite diagnosis was made in the case of the ox, the lesions found appear to have been sufficient to establish it as a case of anthrax.

The meat of the pig had been pickled before it was submitted for examination and gave a negative precipitation test. The sheep was buried immediately after death and was not examined.

The dog had eaten parts both of the ox and the pig. No symptoms were observed until a few hours before death, when the animal was dull and showed difficulty in breathing. There was some swelling of the submaxillary region, and the dog vomited and passed liquid blackish faeces. Post-mortem showed marked congestion of all the organs, the blood black and fluid, ecchymoses on the epicardium, the spleen enlarged but its pulp not diffluent. The kidneys showed necrotic centres and on section evidence of an acute nephritis, superposed on a chronic nephritis. Microscopically the bacillus could be detected in all the organs and it was recovered culturally.

The cultures were used for experimental inoculations and from these it was found that the bacillus was virulent for rabbits, grey and white mice, and dogs, but non-virulent for rats and cats.

HOLMAN (W. L.). **Studies on Anthrax Infection.**—*Proc. Soc. Exp. Biol. & Med.* 1922. Vol. 20. No. 1. pp. 60–61.

Guinea-pigs were fed with cultures of anthrax placed in gelatin capsules, in order to avoid the possibility of infection in mouth. Virulent anthrax spores were found in the faeces up to the 7th day. Two weeks later the animal was inoculated subcutaneously and died. This experiment was repeated with similar results. Spores were found in faeces for varying times up to the 10th day.

A question arose as to whether the amount of loose tissue at the seat of a subcutaneous inoculation has any bearing on the question.

Three guinea-pigs were injected each with about 50 spores in $\frac{1}{20}$ cc. subcutaneously on the abdomen and three subcutaneously on the ear. The three former survived while two of the latter died. The local reaction was very slight and would not have indicated the seat of operation, as it was on the side of the neck in one and along the trachea in the other.

BALTEANO (L.). **L'infection charbonneuse et l'immunité anticharbonneuse chez les lapins et les cobayes.** [Infection with Anthrax and Anti-Anthrax Immunity in Rabbits and Guinea-pigs.]—*Ann. Inst. Pasteur.* 1922. Nov. Vol. 36. No. 11. pp. 805–811.

The author has repeated BESREDKA's experiments and confirms his results.

RABAGLIATI (D. S.). **A Case of Tetanus in a Bull.**—*Jl. Comp. Path. & Therap.* 1922. Dec. Vol. 35. No. 4. pp. 286–291. With 1 text fig.

The author draws attention to the few records of the occurrence of tetanus in cattle that have appeared in veterinary literature during the last 20 years, and concludes that it must rarely come under observation.

The present case occurred in a six-year-old Upper Egyptian bull. The animal had been used for the production of anti-rinderpest serum at Abbassieh, but as he had become dangerously vicious it was decided

to castrate him. As there had not been a case of tetanus at the institute, to the author's knowledge for 18 years, the possibility of its occurrence was not thought of. It is, however, noted that during the war the premises were used as a remount depot and it is possible that a case may have occurred there then.

The operation was performed on July 10, and up to the 23 nothing abnormal was observed. On that day he was off his feed. The castration wounds had completely healed by this time. The following day there was complete loss of appetite, and no faeces were passed. On the four following days purgatives and stimulants were given, but without effect. On July 31 stiffness was noticed and the hind legs were held outwards when the animal turned. There was slight tympanites, and the membrana nictitans was protruded when the animal was approached. Palpation of the muscles showed that they were very hard. From this time onwards clear symptoms of tetanus were observed. In spite of the stiffness, however, the bull was able, with considerable difficulty, to get down and rise. It was observed that the tail was not moved jerkily as it is in equines affected with tetanus. The tympanites never became dangerous, but was present most of the time. All food was refused until August 16.

Handling the patient did not give rise to the spasms seen in affected horses. Save for slight fluctuations the temperature did not show any distinct rise until August 4, when it was 104° F. It remained above normal during the latter part of the attack and for some time afterwards.

The symptoms began to subside on August 13 and the animal began to eat, and ten days later all symptoms of tetanus had disappeared. Tendonitis and synovitis of both forelegs developed, probably as a result of prolonged standing, but these cleared up with suitable treatment in a few days and recovery became complete.

Two intravenous injections of four litres of Tyrode's solution were given on July 31 and August 2, but they were discontinued on account of the inadvisability of casting the bull. Six subcutaneous injections of magnesium sulphate were given each of 30 g. in 200 cc. These produced painful swellings and were not persisted with. Frequent enemata were given and the patient fed per rectum with eggs and milk.

It is not claimed that the treatment effected a cure, as further observations are necessary.

PFEILER (W.) & GOERTTLER (V.). **Ueber den Nachweis der Infektionserreger bei Rauschbrand und rauschbrandähnlichen Erkrankungen durch Untersuchung des Knockenmarkes.** [The Detection of the Bacillus of Blackquarter and the Causal Organisms of Similar Diseases in Bone Marrow.]— *Arch. f. wissench. u. prakt. Tierheilk.* 1922. Aug. 17. Vol. 48. No. 2. pp. 145–149.

The authors advise that in suspected cases of blackquarter bones containing marrow should be sent to the laboratory for diagnostic purposes, as the organisms are more likely to be present in a state of purity.

SEDDON (H. R.). **Impaction Paralysis of Cattle.**— *Jl. Agric. Victoria.* 1922. Sept. Vol. 20. No. 9. pp. 570–573.

This condition has been known for many years in Victoria, and it has been realized that the impaction is a result and not a cause of the

condition. As a result of recent investigations it has been discovered that the paralysis of the muscles of mastication and deglutition along with muscular walls of the alimentary tract is caused by a bacterial toxin.

The organism isolated in Australia was obtained from a bone of an animal dying of the disease, and it therefore appears to be probable that the condition is allied to that observed in South Africa. The prompt destruction of carcasses of animals dead of the disease and the provision of suitable "licks" has led to a marked reduction in the number of cases in Victoria within recent years.

It appears to be probable that bones from infected animals are not the only source of infection, but that the bones of animals dying from any cause may become invaded by the organism producing the toxin and thus become a source of danger. In support of this view the author states that he isolated a toxin producing organism apparently identical with the one discovered in Victoria from some sheep bones from Western Australia which had been buried for two years. In a manuscript note on the copy of the Journal from which this abstract is made the author states that the organism isolated from these sheep is shown by toxin antitoxin experiments to be *B. parabotulinus.*

Treatment is not very practicable for the reasons that the paralysis hinders or prevents swallowing and that toxin has been absorbed by the time symptoms are observed.

ANDERSON (C. M.). **Übertragung von Paratuberculose auf Versuchstiere.** [The Transmission of Johne's Disease to Experimental Animals.]—*Arch. f. wissench. u. prakt. Tierheilk.* 1921. Aug. Vol. 47. No. 1. pp. 77–84. [Journal received Sept. 8, 1922.]

The starting point of the author's experiments was a rabbit which was infected with Johne's disease and which was reported by BANG at the Tenth International Veterinary Congress, 1914. Four rabbits were inoculated subcutaneously with an emulsion of mesenteric gland and intestinal mucous membrane, while two others were fed with the same material mixed with bran. Five of the rabbits survived for about two years, but when killed showed no evidence of infection.

Later two rabbits were inoculated subcutaneously and two intravenously with a pure culture of a strain derived from BANG's rabbit. At the same time four guinea-pigs were inoculated subcutaneously and a fowl intravenously.

One of the rabbits inoculated intravenously died five months later and showed typical lesions containing acid-fast bacilli. The lesions and bacilli were confined to the intestine and its glands.

The remaining three rabbits were killed a year after inoculation. The one inoculated intravenously and one of these done subcutaneously showed typical lesions. The fourth rabbit and the guinea-pigs and fowl showed no evidence of infection.

It would appear that the passage through the goat (BANG's case) had impressed characters on the bacilli which rendered it pathogenic for the rabbit.

Five further rabbits inoculated subcutaneously and intraperitoneally with bovine strain which had been under cultivation failed to become infected.

In December, 1916, three rabbits were inoculated intravenously with an emulsion of mucous membrane from a heavily infected cow. One of the rabbits died three months later and showed typical lesions.

Bacilli were present in immense numbers. It is remarked that this rabbit, like BANG's original rabbit, had been severely bitten by the others.

One of the remaining two rabbits was found to be healthy when killed three months after inoculation, and the other showed marked lesions of the intestine, but bacilli were scantily present.

The author believes that virulence is lost under artificial cultivation.

PANISSET (L.) & VERGE (J.). **La réaction de fixation, dans l'entérite chronique hypertrophiante des bovidés, au moyen des antigènes tuberculeux.** [Fixation Tests in Johne's Disease with Antigens derived from Tubercle Bacilli.]—*Rec. Méd. Vét.* 1922. July 30. Vol. 98. No. 14. pp. 321–325.

The tests have been carried out with serum from six animals. Three of the animals failed to react to the intradermal tuberculin test and when killed were found to be free from tuberculosis; one which also passed the same test is still alive and shows no symptoms of tuberculosis; and the other two were calves inoculated with *Bacillus phlei* subcutaneously. In a footnote the authors state that VALLÉE and RINJARD are publishing an account of the manner in which *B. phlei* may be rendered pathogenic.

Two types of antigen have been used: the alcoholic extract devised by BOQUET and NÈGRE and BESREDKA's egg antigen. The technique was that of CALMETTE and MASSOL, in which varying doses of dilute complement are first titrated against fixed quantities of antigen and serum. The haemolytic system was sheep corpuscles and horse anti-sheep serum. In every case clearly cut positive results were obtained.

These results confirm those obtained by other methods which indicate the non-specific nature of the complement fixation reaction as regards bovine tuberculosis.

NAKAMURA (N.). **Experimental Studies on Avian Diphtheria.**—*Jl. Jap. Soc. Vet. Sci.* 1922. Sept. Vol. 1. No. 3. pp. 123–120. With 2 plates.

In the course of his experiments the author obtained results indicating that the disease is more easily transmitted with materials from recent lesions than from those of longer standing. He has isolated a coccobacillius from a series of cases and, when this organism could not be detected in older lesions, has been able to demonstrate the presence of antibodies in the serum by means of the complement fixation test.

Morphologically and in its staining reactions the organism appears to approximate to the bacillus of fowl cholera. It gives, however, a growth on potato.

A minute dose caused death of pigeons and rabbits in 24 hours. At the seat of inoculation there was more or less extensive suppurative infiltration and general congestion of the organs. The infection was generalized.

"With pigeons injected with smaller doses a characteristic croupo-diphtheritic inflammation developed 8–14 days before death. In these cases the organism was demonstrated only by developed local lesions mixed with other organisms, but not in the heart blood, liver or spleen."

By feeding experiments and by rubbing scarified oral mucous membrane with pure cultures typical mouth lesions were obtained. Similarly typical lesions of the eye followed the installation of pure cultures.

The author was successful in producing protective sera from goats and sheep, but this serum was of no value in advanced cases.

SAKAMOTO (K.). **A Study in Active Immunisation against Fowl Cholera.**—*Jl. Jap. Soc. Vet. Med.* 1922. Sept. Vol. 1. No. 3. pp. 151–154.

Vaccines prepared from cultures whether attenuated or killed by heating, drying, shaking or disinfectants were found to be of little or no value.

Good results were obtained when the vaccine was prepared as follows : 48-hour cultures upon agar were treated with 1 per cent. caustic potash (8 cc. per tube) and left for 48 hours at room temperature. This was neutralized with 1 per cent. acetic acid, which resulted in the formation of a white precipitate. This was washed and dissolved in 1 per cent. sodium carbonate (1·5 cc. per tube). This in doses of 0·1 to 1·0 cc. protected pigeons against large doses of virulent culture.

KOON (G. H.) & KELSER (R. A.). **The Control of Equine Infectious Abortion in the United States Army.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Nov. Vol. 72. No. 2. pp. 193–196.

MOORE (E. V.) & MCAULIFF (J. L.). **Haemorrhagic Septicaemia in Cortland County.**—*Cornell Veterinarian.* 1922. Oct. Vol. 12. No. 4. pp. 289–294.

SEDDON (H. R.). **The Specific Identity of** *Bacillus parabotulinus.*—*Jl. Comp. Path. & Therap.* 1922. Dec. Vol. 35. No. 4. pp. 275–280.

MYCOTIC DISEASES.

MOODIE (R. L.). **Actinomycosis in a Fossil Rhinoceros.**—*Jl. Parasit.* 1922. Sept. Vol. 9. No. 1. p. 28.

The specimen upon which the diagnosis was based was the whole of the right ramus of the lower jaw and part of the left of a rhinoceros. The lesion involved the alveolus of the left large incisor. A portion only of the lesion is in existence. This shows that the exterior is relatively firm while the interior is "mealy in appearance with numerous necrotic sinuses." The sinuses channel out to the surface of the jaw and one had formed into an alveolus. Apparently near the centre of the mass nearly all traces of osseous structure were lost, due to the destructive activity of the ray fungus. There is no indication of healing, and doubtless the infection was active at the time of death of the animal, suggesting that the infection then, as now, was of long duration.

AYYAR (V. K.). **Snoring Disease in Cattle.**—*Madras Veterinary Jl.* 1922. July. No. 15. (No. volume number.) pp. 2–7.

The author states that he has detected a ray fungus as the cause of this condition, which is very prevalent in Southern India. Further publication of details is promised.

ROGER (J.). **Au sujet des Plaies d'Été.** [Summer Sores.]—*Rec. Méd. Vét.* 1922. Oct. 30. Vol. 98. No. 20. pp. 430–431.

By sowing out on SABOURAUD's agar material scraped from summer sores, the author has succeeded in cultivating a yeast which gives a creamy growth of a pink (" shrimp ") colour, and a spore which shows thickenings of its envelope, giving the appearance of a cog-wheel. The latter yields a black dusty growth in primary culture. The first subculture is white. In the second the colonies have haloes and their surface is irregular. The third subculture is comprised of a wrinkled growth powdered over with black, and the fourth resembles the primary culture.

In broth there is a mycelial growth on the surface and the liquid assumes a greenish tint. Subcutaneous inoculation of laboratory animals has not caused infection.

The pruritus, which is one of the marked symptoms, may be alleviated by the subcutaneous injection of boiled distilled water under the lesion. Carbon bisulphide as an ointment has given good results.

DISEASES DUE TO FILTERABLE VIRUSES.

BOYÉ. **La rage canine au Moyen Congo.** [Canine Rabies in the Middle Congo.]—*Ann. Méd. et Pharm. Colon.* 1922. May–Aug. No. 2. pp. 228–231.

The first case of canine rabies has been detected in the Middle Congo. The dog in question was a large one of a European breed which had come from the Belgian Congo, and which was found by villagers in the jungle near Maloukou. It bit a number of other dogs, some fowls and some of the villagers. It was captured and taken to Brazzaville. It was impossible to keep it under observation as it was in a condition of extreme excitement.

Inoculations were made with its medulla into guinea-pigs and rabbits and the conclusion arrived at was that the case was probably one of African rabies, which has already been observed in West Africa, and which does not appear to be transmissible to man. None of the villagers bitten showed any suspicious symptoms, and one of these was bitten on the lip. Nevertheless in view of the difficulty of making a definite differentiation between the two types of the disease, regulations regarding dogs were put into force. The native dogs were quickly killed off, but European dogs were left. A second case of rabies occurred in one of these.

Some experiments were carried out with the virus obtained from the first dog.

Five passages of this through the rabbit regularly caused death in from 15 to 20 days.

Rabbits inoculated from the brain of the second dog had not shown any symptoms up to the time of the report, viz., 12 days.

Two rabbits were inoculated with the brain a of rabid rabbit imported from Paris. Immediately afterwards one of these was given protective treatment with the brain of a rabbit killed with the African virus. The untreated one died on the ninth day and the other survived.

Similar comparative tests between the fixed virus and the African virus have been carried out on too few animals, and contain so many unknown factors that no opinion as to their value can be expressed.

REMLINGER (P.). **Contribution a l'étude de l'atténuation du virus rabique fixe pour l'homme.** [The Attenuation of the "Fixed Virus" for Man.]—*Arch. Insts. Pasteur de l'Afrique du Nord.* 1921. Vol. 1. No. 3. pp. 233–235.

In this article the author describes a case in which, in error, a spinal cord which had been desiccated for 44 hours only was used for a subcutaneous injection in mistake for one which had been desiccated for six days. No ill effects resulted. The cord used was approximately at its 1,300th passage.

VICARIOTTO (S.). **Sull' incubazione della rabbia.** [The Period of Incubation in Rabies.]—*Jl. Mod. Zooiat.* 1922. Sept. Vol. 33. No. 9. pp. 217–218.

The author records a case of rabies in a horse in which the period of incubation was 143 days.

SCHEIN (H.). **Note sur la peste bovine.** [Note on Cattle Plague.] —*Rec. Méd. Vét.* 1922. Nov. 15. Vol. 98. No. 21. pp. 621–632.

The author objects that he has been misread by van SACEGHEM and CROVERI, who make references to his work in their own publications. These authors have criticized the quantity of serum used by Schein in immunizing animals by the simultaneous method. Schein replies that the dose criticized—50 cc. per 100 kg. body-weight—refers to the dose for the extremely susceptible eastern buffalo.

Van SACEGHEM's criticism is that the "enormous dose" of serum neutralizes the virus injected at the same time. Schein's criticism of this is that his own and others' experiments have shown that anti-rinderpest serum has no direct action upon the virus in the way of neutralizing or destroying it. He holds that the serum acts by strengthening the defences of the body in some way. For very susceptible animals, therefore—goats, buffaloes and pure bred stock—he injects the serum first with a view to "impregnating" the animal. On the other hand the ordinary cattle of Indo-China may be injected simultaneously with serum at the rate of 27 cc. per 100 kg. and 5 to 6 litres of blood or peritoneal washings. The effect of the serum is held to be not proportional to the amount of virus injected. The poor curative properties of serum are held to support this view.

Van SACEGHEM gives a very small dose of virus and after an interval of four or five days injects a large quantity of serum intravenously. The results obtained in Indo-China contraindicate this method.

Attention is drawn to the danger of intravenous injections of serum.

Schein objects to CROVERI's method in that the latter furnished no evidence by means of controls that his diluted virus was virulent.

Schein gives his reasons for believing that the virus of cattle plague is localized in the leucocytes and not in the red corpuscles, as many authors think. Schein criticizes GORDZIAKLOWSKI's attempts to attenuate the virus by heat, and points out that this method has been tried by others and has failed.

Moussu (R.). **Observations clinique et recherches experimentales sur la méningo-encéphalomyélite enzootique du Cheval (Maladie de Borna).** [Clinical Observations and Experimental Investigations regarding Borna Disease.]—*Rec. Méd. Vét.* 1922. Sept. 15. Vol. 98. No. 17. pp. 499–511. With 2 charts.

The outbreak described occurred in a thoroughbred breeding establishment which comprised in all some 80 animals. Fifteen cases occurred in less than two months, and of these six were fatal.

There appeared to be two types of the disease, which are designated by the author meningo-encephalitis and meningo-myelitis. In some instances symptoms of both of these conditions were observed, in fact the " mixed " form of the disease accounted for nine of the cases.

In the meningo-encephalitis cases there were periods of extreme excitement, which became longer and more frequent as the disease progressed. The temperature which was normal at first became slightly raised in the later stages. There was no observable motor paralysis save that deglutition appeared to be difficult, and there was only a dullness of sensation ; pin-pricks always elicited a response.

The meningo-myelitis form was observed in one instance only. In this case motor paralysis was marked in the hind quarters. There was a constant escape of highly albuminous urine, and the temperature was below normal. The case was first under treatment, and after remaining stationary for four days began to improve. Eventually a complete recovery was made. The paralysis disappeared in a week, and the albuminuria after a fortnight. All the animals which showed the meningo-encephalitis symptoms died, but only one of those showing what the author describes as the " mixed " form of the disease. In the former cases death took place within 40 hours, but in the latter the animal lived for six days.

The lesions found post-mortem were those of an acute or rapidly fatal septicaemia, and the author draws special attention to the fact that they very closely resembled those of anthrax. Anthrax was in fact excluded as a result of negative inoculation tests.

The cases were treated by subcutaneous injections of urotropine (15 g. twice daily in 150 cc. of tepid salt solution), and the same drug in 10 g. doses appeared to be of value as a prophylactic.

As a result of certain experiments, which are briefly described, the author concludes that Borna disease is due to a filterable virus and is transmissible to the rabbit. In all cases the inoculations were made into the anterior chamber of the eye.

Woodcock (H. M.). **Are the Active Principles of Filter-passing and " Ultramicroscopic " Viruses Living Organisms or Enzymes ?**—*Jl. Royal Army Med. Corps.* 1922. Oct. Vol. 39. No. 4. pp. 243–260. With 10 figs.

As this paper contains expressions of the author's views it does not lend itself readily to abstraction.

Broadly speaking, he takes exception to the view that the small granules, which stain red with Giemsa, which have been detected in infective materials in some of the diseases due to filterable viruses, are the actual causes of those diseases. In a previous paper [*Jl. Royal Army Med. Corps.* 1921. Vol. 37. p. 423] he has given his reasons for believing that such granules result from the breaking down of organized material. A further point upon which he takes a stand is that " it is highly probable that all living organisms contain chromatin,"

and that chromatin is recognizable by means of definite stains, such as iron haematoxylin.

A considerable part of the present paper is devoted to an elaboration of the above views.

The opinion is expressed that the causes of the " virus diseases " are enzymes, and the suggestion is put forward is that the cells acted upon by such enzymes in turn produce more of them.

The " granules " while not representing the viruses do " indicate " them, in that they represent the only objective manifestation which we can at present obtain of their existence.

The difficulty of explaining the development of immunity to virus diseases has to some extent been overcome by the production of antilytic serum by BORDET & CIUCA.

Viruses have as yet been cultivated in tissue-containing media only, and the author explains the multiplication of the virus (the increase in the amount of enzyme) on the grounds that fresh quantities of enzyme are liberated through the destruction of the tissue cells in the media.

DE BLIECK (L.) & WINKEL (A. J.). **De virulentie van de smets tof van het mond— en klanwzer in den Winter 1921-1922.** [The Virulence of the Virus of Foot and Mouth Disease during the Winter 1921-22.]—*Tijdsch. v. Diergeneeskunde.* 1922. Oct. 15. Vol. 49. No. 20. pp. 711–720.

PFEILER (W.) & GOERTTLER (V.). **Zur Züchtung des " Kultur-Virus " der Maul- und Klauenseuche. Seine Identifizierung mit Hilfe von Immunitätsreaktionen.** [The Cultivation of the " Culture-Virus " of Foot and Mouth Disease and its Identification by means of Immunity Reactions.]—Sonderabdruck aus "*Tierärztliche Rundschau.*" 1922. No. 26.

MISCELLANEOUS.

CHURCHMAN (J. W.). **The Mechanism of Bacteriostasis.**—*Proc. Soc. Exp. Biol. & Med.* 1922. Vol. 20. No. 1. pp. 16–18.

It is generally assumed, and almost always correctly so, that if bactericidal substances added to culture media exhibit selective hostility to bacteria they will exhibit a hostility—selective in the same sense—when added directly to the organisms themselves.

This assumption is not always justified. If *B. prodigiosus* and *B. megatherium* be planted on fuchsin agar the former grows well and the latter not at all. If, however, the organisms be first exposed to acid fuchsin and then planted the reverse occurs. A similar result is obtained with the flavines. It is suggested that the bacteriostasis produced when the bacteria are exposed to the substance before planting should be termed intrinsic bacteriostasis, and that occurring when the bacteria are planted on a medium containing the substance as extrinsic bacteriostasis. The author believes that the selective action is dependent upon the H.-ion concentration at the surface of the bacteria.

CHURCHMAN (J. W.). **Bacteriostasis with Mixed Dyes.**—*Proc. Soc. Exp. Biol. & Med.* 1922. Vol. 20. No. 1. p. 19.

Chemotherapy is largely concerned with attempts to strengthen the weakness of bactericidal and parasiticidal substances. It has recently

been found that in some cases this may be achieved by mixing dyes which have previously been shown to have opposite bacteriostatic properties. It has also been shown, for example, that acid fuchsin and gentian violet possess bacteriostatic properties which are in many important respects opposed. These dyes, however, cannot be mixed.

The author has discovered that neutral acriflavine, which resembles acid fuchsin in its bacteriostatic properties, will mix with gentian violet, and that the resulting substance acts like a mixture.

If an emulsion containing *B. anthracis* and *B. pyocyaneus* be exposed to gentian violet and streaked on plain agar, a culture of *B. pyocyaneus* will result. If the gentian violet be replaced with acriflavine a growth of *B. anthracis* will be obtained. If the dyes be mixed no growth is obtained.

SENEVET (G.). **Emploi de l'alun de fer pour le nettoyage des lamelles dévitrifiées.** [The Use of Iron Alum for Cleaning Devitrified Slides.]—*Arch. Insts. Pasteur de l'Afrique du Nord.* 1921. Vol. 1. No. 3. p. 337.

It is well known that, particularly in tropical countries, slides kept for a long time in their original boxes assume a milky appearance as a result of partial devitrification.

Such slides may be cleared by allowing them to remain in a 3 per cent. solution of iron alum for a variable length of time, depending upon the degree of milkiness and then rubbing them while in the solution between the finger and thumb. They are then washed and dried and are ready for use.

ANDREWS (W. H.). **Criticism of Dr. Scharrer's paper on Bovine Staggers.**—*Jl. Comp. Path. & Therap.* 1922. Dec. Vol. 35. No. 4. pp. 280–285. [For abstracts of Andrews' original paper and Scharrer's paper see this *Bulletin*. 1922. Aug. Vol. 10. No. 3. p. 94; and Nov. No. 4. p. 138.]

Andrews draws attention to the complete absence of description of the methods employed and of details in respect to any experimental case of intoxication, rendering it impossible for any personal judgment to be passed on the conclusions drawn.

SCHARRER refers to the occurrence of symptoms of gastro-enteritis, nephritis, irritation of the sexual organs in domestic animals soon after they have eaten the plant. Andrews observed none of these, save that half the cattle used showed evidence of abdominal pain.

Andrews traverses SCHARRER's statement that loss of condition is noted before symptoms appear. This was never observed in natural cases, but only in experimental animals having an unnaturally large amount of the plant. Even in these it was considered to be possibly due to partial starvation in conjunction with the large amount of matricaria.

SCHARRER states that a larger dose is tolerated if spread over a long period. Andrews' results indicated that within limits prolonging the period of administration tended to cause a smaller amount to become effective.

SCHARRER states that bovine staggers occurs mainly at the end of the autumn and refers to the connection between glucoside formation and the maturing plants. Andrews' extensive inquiries indicated that the spring is the main staggers season, and he draws attention to the fact that most of the plants have matured long before the autumn.

With regard to SCHARRER's statement that the period of incubation may be as long as 12 to 15 weeks, Andrews comments that there is reason to believe that during this period some of SCHARRER's cattle were in paddocks where the plant was actually growing, but he does not deny that under certain conditions it may be even longer. The absence of experimental evidence in support of SCHARRER's statement that the intoxication could be prevented or delayed by giving food rich in albumen is severely commented upon. Andrews' experiments completely negatived this. The criticisms of the chemical portion of the paper are detailed and cannot be summarized succinctly, but Andrews draws attention to many inaccuracies and inexplicit statements which are not supported by experimental evidence.

STOCKMAN (S.). **Bracken Poisoning in Cattle in Great Britain.**— *Jl. Comp. Path. & Therap.* 1922. Dec. Vol. 35. No. 4. pp. 273–275.

The author publishes details of two experiments on bracken poisoning with a view to clearing up doubts which have been expressed regarding the occurrence of this condition. Several factors have led to doubt being cast upon the possibility of poisoning occurring through the ingestion of bracken. These are : (1) bracken appears to be poisonous during certain parts of the year only (August to November) ; (2) a considerable quantity spread over 3–4 weeks must be ingested in order to produce symptoms ; (3) the occurrence of high temperature (107°) in the acute stage.

A second reason for carrying out the experiments was to obtain evidence on the question of whether the condition might not in reality be one of the forms of scurvy.

In the first experiment a calf was fed with a ration of 4 lb. (increased three days later to 6 lb.) of newly cropped bracken together with bran and oats. Twenty-seven days later the animal looked ill and refused food, and the temperature rose to 107° and definite symptoms appeared. In view of the suggestion that the condition might be one of avitaminosis feeds of swedes were offered. They were refused but eaten the next day. The temperature was now 105° and the animal was unable to rise the following day and died.

In the second experiment the swedes, which are rich in vitamins, were given with the bracken with a view to ascertaining whether they would influence the progress of the condition in any way.

By the end of the fourth week the calf had eaten 112 lb. of bracken and symptoms made their appearance. The temperature rose to 107° and the animal died showing typical symptoms two days later.

Results of further experiments on other species and with extracts are promised.

MOTAS (C.), PURICESCO (O.), SACHELAIRE (V.). **Quelques essais de traitement de la maladie des chiens par le Néosalvarsan.** [The Treatment of Distemper with Neosalvarsan.]— *Archiva Veterinaria.* 1922. Vol. 16. No. 4. pp. 165–168.

The authors give details of six cases of distemper treated with neosalvarsan, and they conclude that :—

1. Doses of 0·05 to 0·1 g. may be given with safety by intravenous injection (1 g. in 20 cc. of distilled water).

2. In the septicaemic form of the disease the temperature drops within six hours.

3. Marked improvement takes place in 4 to 5 days and recovery follows.

4. It remains to be ascertained whether an animal that has been cured can be reinfected.

ROBERT (L.). **Un cas d'Anaphylaxie locale à l'émétine. Oedème envahissant, pruril intense, puis érythème vésiculeux consecutifs à des injections d'émétine.** [A Case of Localized Anaphylaxis due to Emetine.]—*Bull. Soc. Path. Exot.* 1922. Oct. Vol. 15. No. 8. pp. 680–683.

The case in which the symptoms referred to in the title were observed was one of dysentery. The disease first manifested itself in 1910. In 1916 the patient appeared to make a complete recovery as a result of four injections of emetine. Four years later the disease again appeared and again an apparent cure was effected by four injections of emetine. On neither occasion were untoward symptoms observed after the injections. A relapse occurred two months after the second set of injections and treatment was begun again with emetine. The first injection produced no local effects, but the second was followed by the development of a slight temporary oedema at the seat of injection accompanied by a moderate amount of pruritus. The patient appeared to recover.

Several months later a relapse occurred and the patient who lived at a considerable distance from Bangkok treated himself with injections, having taken the precaution of providing himself with ampoules of the drug. He gave himself eight injections in all and after each there was progressively more extensive oedema and more severe pruritus. These were put down to some defect in the drug, but as recovery took place the matter rested at that.

In 1922 dysentery again made its appearance. Examination revealed the presence of active and encysted amoebae and *Lamblia intestinalis.*

On applying emetine treatment the severe oedema and pruritus were again developed. Four injections were given with the same results. A cuti-reaction with emetine again produced oedema and pruritus.

The patient shortly afterwards consulted another doctor, and in spite of previous experience had an injection of emetine. The oedema produced was on this occasion complicated for the first time by the development of vesicles.

LEGER (A.). **Corps de Graham-Smith dans les hématies d'un Primate** (*Macacus rhesus*). [Graham-Smith Bodies in the Red Corpuscles of a *Macacus rhesus.*]—*Bull. Soc. Path. Exot.* 1922. Oct. Vol. 15. No. 8. pp. 679–670.

The author agrees that Graham-Smith bodies are parasites. He found them in the blood corpuscles of a *Macacus rhesus* in the Hué Laboratory (Annam). Corpuscles containing them were present in the proportion of one in eight to ten fields of the microscope. They were bacillary or coccus-like in shape and were not evenly distributed throughout the containing corpuscles, but appeared to be more or less

massed together. They could not be detected in moist films. The blood showed no corpuscular abnormalities save the occasional presence of a nucleated red cell.

The animal showed no evidence of ill-health and the bodies showed no changes during the time that the animal was under observation (two months).

The name *Grahamella rhesi* is suggested.

BAUER (H.). **Die Lahmkrankheit des Rindes in Südafrika und Kochsalzvergiftung.** [Lamziekte in South Africa and Salt Poisoning. —*Arch. f. wissensch. u. prakt. Tierheilk.* 1922. Sept. 19. Vol. 48. Nos. 3 & 4. pp. 153–201.

This paper is an abridged copy of an earlier "dissertation" by the author. The greater part of it is made up of an account of other investigators' views regarding lamziekte. The author is of the opinion that the disease is in reality due to salt poisoning.

VELU (H.). **Rapport sur le fonctionnement du "Laboratoire de Recherches au Service de l'Elevage du Maroc" pendant l'année 1920.**—*Arch. Insts. Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. pp. 338–344.

VELU (H.). **Rapport sur le fonctionnement du "Laboratoire de Recherches du service de l'Elevage du Maroc" pendant l'année 1921.**— *Arch. Insts. Pasteur de l'Afrique du Nord.* 1922. Sept. Vol. 2. No. 3. pp. 444–450.

REVIEW.

SEURAT (L. G.) [Professeur-adjoint à la Faculté des Sciences, Université d'Alger]. **Histoire naturelle des Nématodes de la Berbérie. Première Partie. Morphologie, Dévelcppement, Ethologie et Affinités des Nématodes.**—1920. Algiers. Université d'Alger. Publication de la Faculté des Sciences. pp. 1–221. With 34 text figs.

This is the first part of a monograph on Nematodes. Although its scope is restricted to those forms occurring in Northern Africa, the fauna of that region is in this respect sufficiently rich to furnish representatives of every group. The work is therefore rather more comprehensive than its title would at first sight suggest. It is divided into ten chapters, of which the first five are mainly devoted to a systematic survey of morphological characters, Chapters 6 and 7 to development and life history, Chapter 8 to habitat and geographical distribution, Chapter 9 to variation, vital resistance and the parasites of nematodes, and Chapter 10 to a consideration of the relationships and affinities of nematodes with other groups. Under each of these headings the free-living nematodes, as the older and simpler type, are first considered. Subsequently the parasitic forms receive separate treatment, the amount of space devoted varying with the degree of modification or specialization which has taken place in the process of adaptation to a parasitic existence.

The morphological section occupies 91 pages. The author endeavours to indicate the primitive form of each structure, to discuss briefly its embryology and finally to indicate subsequent modifications and specializations, most of which are furnished by the parasitic forms. From the medical or veterinary point of view the most interesting portion of the work begins with the consideration of copulation and the development

of the embryo in the egg. It is noted that the males search for females of the same species. It is a fact, however, that in the case of certain species of *Strongylus* and *Cylicostomum*, parasitic in equines, one not uncommonly finds mixed copulation taking place, even where both sexes of each of the two species concerned are present in the contents of the gut. Attempts by MAUPAS to induce cross-breeding between two geographical varieties of the same species (*Leptodera maupasi*) were unsuccessful, and efforts by the same worker to hybridize two closely related species of *Diplogaster* resulted in the production of sterile hybrids. These observations suggest that in the case of the mixed copulations of cylicostomes production of sterile hybrids is possible. It is observed that among certain oxyurids copulation takes place between an adult male and an immature female. A similar arrangement is seen among mites, where the male usually fertilizes the female nymph.

Passing to the extremely interesting sections dealing with development and life-history, the author deals first with the simplest type of free-living nematode, using *Cephalobus ciliatus* as the example. From the egg of this species is hatched a first stage larva, which moults after about four days. The second stage undergoes a further moult under favourable conditions eight days after the first. Under conditions of comparative drought the second stage larva encysts in its old cuticle after the second ecdysis, but under normal conditions the development proceeds uninterrupted, the second ecdysis is completed and the third moult takes place some nine days later. After ten or eleven days the larva undertakes the fourth and last moult, and becomes adult. The most interesting feature of this simple life-history is the ability of the larva to remain ensheathed or encysted after the second ecdysis if conditions are unfavourable. It is upon the survival of this encysted stage that the continuity of species depends throughout both free-living and parasitic groups, from the very simple to the most complex and highly organized forms.

Heterogonic Nematodes.—Passing to the more highly developed forms, Seurat considers under this heading forms in the life-cycle of which both free-living and parasitic conditions obtain. The ensheathed larvae of *Rhabditis pellio* are able to enter the body cavity of various invertebrates and there remain quiescent until circumstances favour the continuance of their evolution. The life-history of *Strongyloides stercoralis* represents a considerable advance in adaptation to the habit of parasitism. The members of this genus are common parasites of man and domesticated animals in tropical and sub-tropical regions. The parasitic stage consists of parthenogenetic females producing eggs which hatch in the intestine, liberating rhabditiform larvae which pass out in the faeces. The precise form which the evolution of these larvae takes depends on the temperature. If the temperature is from 25° to 35° C., as is usual in the tropics, the development proceeds along the usual lines to the free-living adult forms with separate sexes. The free-living female deposits some 30 or 40 eggs which hatch rapidly, liberating rhabditiform larvae. These first stage larvae after a moult become filariform or strongyloid larvae, and as such are capable of infecting a host by the mouth or skin and developing into the parthenogenetic parasitic stage. If the temperature to which larvae leaving the intestine of the host are exposed is below 20° C. the life-cycle is short-circuited, completely cutting out the free-living phase. Under these conditions the larvae moult, becoming filariform and ready for immediate re-entry into the host. According to Seurat it is probable that the infective larvae in both of these cases are ensheathed.

Purely Parasitic Forms.—Seurat divides these into two groups—Monoxenous and Heteroxenous.

Monoxenous Parasites.—These are parasites with a direct life-cycle, making use during life of one host only. It is convenient to divide these into two groups—those the eggs of which are usually small, thin-shelled and poor in food material, and those with larger eggs, enclosed by a stout shell, and usually containing a considerable reserve of food material.

In the first category are included such forms as *Haemonchus, Strongylus, Ancylostoma, Uncinaria,* etc., and in this group eggs give rise to a small rhabditiform larva which feeds and grows rapidly. After the first moult the larva loses its rhabditiform characters, but continues to feed. Finally it moults, remaining within the old cuticle of the second stage as an ensheathed larva. The ensheathed larva possesses a varying but always considerable degree of resistance to desiccation and cold, and of course requires no food. This stage is infective for the host animal in certain cases (*Ancylostoma, Stephanurus*) by skin or mouth, in other cases by mouth alone (*Haemonchus,* etc.). The remaining moults take place in the body of the host. It is perhaps relevant to mention here that in the case of some of these forms (*Ancylostoma*) the larvae pass through the lung *en route* for their final location in the intestine. Other forms (*Cylicostomum, Oesophagostomum*) enter the wall of the intestine and there undergo larval development.

In the second category it is found that the reserve of food material in the large egg is sufficient to nourish the larvae during the first and second stages, thus rendering it entirely independent of its environment in this respect. In this second group one finds such forms as *Dictyocaulus, Ostertagia, Nematodirus, Ascaris, Oxyuris,* etc. In the case of the common bronchial parasites of sheep and cattle, *Dictyocaulus filaria* and *D. viviparus,* the egg hatches, liberating a first stage larva without mouth opening or rhabditiform oesophagus. Although the larva does not feed, it undergoes a moult and reaches the ensheathed stage or period of the second moult under free-living conditions. It is then in the infective stage, and possesses considerable powers of resistance owing to its possession of a sheath. In the case of *Ostertagia* the first ecdysis takes place within the egg, the larva at the time of hatching being in the second stage. Ensheathment follows soon after hatching. The first ecdysis and part of the second up to separation of the old cuticle takes place in the eggs of *Nematodirus,* the larvae being ensheathed when hatched. In certain species of *Nematodirus* this encystment actually takes place in the uterus of the female prior to deposition. *Ascaris lumbricoides* progresses still further in the adaptation of the egg to the protection of the larva from external conditions. The larvae in the case of *Ascaris* do not leave the eggs until the latter have been taken into the body of the host. The extreme powers of resistance of the eggs of *Ascaris* are too well known to need more than a passing reference. Ecdysis within the egg has not been observed in the case of *Ascaris lumbricoides,* but NEUVILLE and Seurat observed encystment within the egg in the case of *Toxascaris leonina.* The egg of *Oxyuris* (*Enterobius*) *vermicularis* contains a first stage larva at the time of deposition. It is probable that when the eggs are evacuated in the faeces or rectal mucus the larvae within the egg have reached the second or infective stage.

Heteroxenous Nematodes.—In this group the free-living phase is more or less suppressed and a period of existence in an intermediate host is substituted. The first stage larvae of *Camallanus lacustris* are set free in water, where they may live some weeks. It is only after entering the body of a small crustacean (usually *Cyclops* sp.) that a moult takes place and the second stage larva proceeds to become ensheathed. It is in this stage that the transfer to the intestine of the final host (perch, etc.) takes place. The development of the Guinea-worm is in all essentials similar. In the case of Spirurids and Acuariids the egg generally does not hatch until taken in by the intermediate host, usually a coprophagous beetle. In the body of the intermediate host the larva reaches the ensheathed stage, and so remains until taken in by the definitive host. This group includes *Spirocerca, Physocephalus, Gongylonema,* etc. A further modification is shown by such forms as *Dirofilaria immitis.* The embryos still enclosed within the vitelline membrane are free in the general circulation of the host. They pass into the stomach of the mosquito still in this embryonic envelope and migrate to the Malpighian tubules; later the larvae burst out of the tubules and eventually gain the labium of the

insect, to be reinoculated into the definitive host. It does not appear to have been ascertained how many actual moults (if any) take place in the body of the mosquito, but analogy would suggest that the larvae are possibly in the ensheathed stage at the time of their transference to the final host. In this group fall *Loa*, *Acanthocheilonema*, etc. *Trichina* furnishes the last group of veterinary interest. Here the larvae are encapsuled in the skeletal muscles of the actual host that harbours the adult forms. The ensheathed larvae may subsequently gain access to the intestine of another host of the same species or one of the alternative hosts of the parasite. *Trichinella spiralis* is thus unique in that the one animal harbours the adult and at the same time serves as intermediary host for the developing forms.

It is probably unnecessary to state that the author is unable to deal in detail with the life-history of every parasitic nematode where this is known. What has actually been done is to analyse the life-history of these forms and to arrange them in arbitrary groups according to their manner of development. Such grouping must perforce be somewhat elastic. The arrangement reached in this manner does not differ strikingly from the usually accepted scheme of systematic classification. This fact speaks for the accuracy and soundness, of the author's observations on the one hand, and of the general systematic classification on the other. The monograph will prove extremely valuable to all workers in helminthology.

R. Daubney.

TROPICAL DISEASES BUREAU.

TROPICAL VETERINARY BULLETIN.

VOL. 11.] May 31, 1923. [No. 2.

DISEASES DUE TO PROTOZOAN PARASITES.

DUKE (H. L.). **An Inquiry into an Outbreak of Human Trypanosomiasis in a "** *Glossina morsitans* **" Belt to the East of Mwanza, Tanganyika Territory.**—*Proc. Roy. Soc.* 1923. Jan. 4. Series B. Vol. 94. No. B. 660. pp. 250–265. With 1 map.

In this paper the author gives an account of his investigations into an outbreak of human trypanosomiasis in Tanganyika. The author's views of the results obtained may be summarized as follows :—

The outbreak occurred in an area where *G. palpalis* has not been found, but where a *morsitans*-like fly is present everywhere. It is improbable that the trypanosome was *T. gambiense*, the evidence all pointed to it being transmitted directly from man to man, and it closely resembled the game trypanosomes of the belt. In the author's opinion the trypanosome was *T. brucei*.

About 1919 there was a very severe famine, and at the same time an epidemic of influenza. The famine led to the slaughter for food of wild and domestic animals, and was responsible, in conjunction with the influenza, for a lowering of the vitality of man. At the same time the disappearance of animals caused the *morsitans*-like flies to attack man. It appears to be probable that in this way the human beings became infected with *T. brucei*. It can never be ascertained whether prior to this period there was a trypanosome capable of surviving in man in this belt. The whole of the circumstances indicated that once a native had become infected the infection spread to those who came in contact with him, and in such a manner and with such manifestations as to indicate that the spread of the infection was mechanical.

Dissections of large numbers of flies failed to indicate any increase in the number of flies cyclically infected (in comparison with figures obtained by BRUCE, Miss ROBERTSON and the author in other areas).

MACKENZIE (A. J.). **Case of Trypanosomiasis.**—*Ann. Trop. Med. & Parasit.* 1922. Dec. Vol. 16. No. 4. p. 457.

The infection was contracted in a fly area in Sebungwe, S. Rhodesia. Posterior nuclear forms were found. Galyl, soamin, and tartar emetic were without effect. The case terminated fatally.

Hyperaesthesia, change of mentality, keratitis, and progressive emaciation were the most prominent symptoms.

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NÖLLER (W.). **Die Übertragung des *Trypanosoma theileri* Laveran 1902.** [The Transmission of *T. theileri*.]—*Berlin. Tierärzt. Wochensch.* 1916. Sept. 28. Vol. 32. No. 39. pp. 457–460.

The author gives an account of experiments which yielded evidence that *T. theileri* is transmitted by *Tabanus glaucopis*, and that the transmission is not purely mechanical.

VAN SACEGHEM (R.). **Les infections doubles à trypanosomes pathogènes.** [Double Infections with Pathogenic Trypanosomes.]—*Compt. Rend. Soc. Biol.* 1922. Oct. 28. Vol. 87. No. 31. pp. 994–995.

In this note the author draws attention to the necessity of keeping in mind the possibility of simultaneous infection with two species of trypanosomes when two recognizably distinct forms are encountered in the blood.

VAN SACEGHEM (R.). **L'intrapalpébro-réaction dans le diagnostic des Trypanosomiases.**—*Compt. Rend. Soc. Biol.* 1922. Oct. 28. Vol. 87. No. 31. pp. 992–993.

The author uses a special antigen, which he terms " trypanoléine," for the diagnosis of trypanosomiasis by the intra-palpebral test. The material is prepared as follows : To tubes of Ponselle medium (2 per cent. unwashed agar in tap water in slants) are added 5 to 10 cc. of defibrinated blood containing large numbers of trypanosomes. It is not stated whether the agar is melted before the blood is added. The tubes are left at room temperature for three days. The blood, which has been transformed by the hypoto. ic medium into a deep red liquid, is collected and mixed with an equal amount of a mixture containing glycerin and physiological serum in equal parts. A few drops of carbolic acid are added as a preservative.

In some cases cultures of *T. theileri* are obtained in the medium. These should be rejected.

A dose of 1 cc. of trypanoléine injected intra-palpebrally produces a characteristic reaction in infected persons and animals. It reaches its maximum at the third hour and may persist for several hours.

The reaction is not a specific one, but is of a general nature, and is characterized by lachrymation and a tense painful oedema of the eyelid, but it is never so intense as that obtained with mallein in glandered horses.

The author appears to imply that the test is infallible, but gives no account of any investigations designed to prove that non-reactors were not infected.

VAN SACEGHEM. **Sérothérapie des Trypanosomiases animales.** [The Serum-Therapy of Animal Trypanosomiases.]—*Bull. Agric. Congo Belge.* 1922. June. Vol. 13. No. 2. pp. 358–362.

The author has observed on a number of occasions that in some cases of chronic trypanosomiasis of animals the blood is sterile—as proved by inoculation—at the time of death. He believes that antibodies elaborated by the animal are responsible for this clearing of the circulation. It appears, however, that some of the trypanosomes escape this destruction by converting themselves into " special " neurotropic forms, which are incapable of living in the circulation, but " vegetate " in the cerebro-spinal liquid, where they are protected against the antibodies in the blood.

The question he has set himself to answer is whether the serum of an infected animal, which exerts only a feeble action on the trypanosome responsible for the production of the antibodies, might not be used for the treatment of trypanosomiasis in another animal.

Five goats were inoculated with 5 cc. of blood from a beast infected with *T. ruandae*. Six to ten days later trypanosomes appeared in their blood. Three of the goats received weekly subcutaneous injections of 100 cc. of serum from cattle affected with chronic trypanosomiasis for five weeks. The injections did not cause the immediate disappearance of trypanosomes from the circulation. The goats remained in good condition and apparently perfectly healthy. Although it is specified that the injections were repeated weekly for five weeks, it is stated that treatment lasting two months sufficed to clear the circulation of trypanosomes completely. Three months later the goats were considered as completely cured.

The two control goats died of trypanosomiasis. It is held to be probable that serum treatment of infections contracted naturally through flies will be more effective than the treatment of animals infected experimentally, as in the latter case the trypanosomes have to some extent acquired a degree of resistance to the antibodies which their presence in the animal has provoked.

VAN SACEGHEM (R.). **La Sérothérapie dans le traitement des Trypanosomiases.** [Serum-Therapy in the Treatment of Trypanosomiases.] —*Compt. Rend. Soc. Biol.* 1922. Oct. 28. Vol. 87. No. 31. pp. 995–998.

The author promises a detailed account of the experiments briefly referred to in this paper. It may be gathered that he found that fat-tailed sheep could be infected with *T. congolense*, and that after a course of some months recovery occurred. He further found that massive doses (a litre) of blood containing the trypanosome could be injected subcutaneously with a view to reinforcing the immunity. He believes that the antibody produced is not anti-trypanosomic, but anti-trypanotoxic. The elaboration of endotoxins by trypanosomes is held to be established because the author finds that a small non-toxic dose of emetic, if given to an animal harbouring trypanosomes, is sufficient to cause death of the animal, the death being due to liberated endotoxins.

The curative effect of emetic is said to be explained as follows: The emetic causes destruction of trypanosomes, and thus reduces the production of toxin, but the production of antitoxin continues, and by adjusting the intervals between doses a kind of reserve of antitoxin is built up which in time is sufficient to effect a cure.

RODENWALDT (E.) & DOUWES (J. B.). **Over de toepassing van Bayer 205 bij de Surra van het Paard in Nederlandsch-Indië.** [Employment of "Bayer 205" for the Treatment of Surra in Horses in the Dutch East Indies.]—*Nederlandsch-Indische Bladen v. Diergeneesk. en Dierenteelt.* (Veeartsenijkundige Mededeeling No. 38.) 1922. Vol. 33. Nos. 5 & 6. pp. 1–79. With 2 Plates (3 figs.) and 27 tables in text. (Buitenzorg, Java.)

The authors of this important paper—one of them from the Institute of Tropical Medicine at Hamburg, the other a Dutch veterinarian—have recently been engaged in treating horses, suffering from surra,

with " Bayer 205." Their investigations, carried out in the Veterinary Laboratory at Buitenzorg, are here summarized and discussed at length ; and it may be said at once that they possess considerable interest for all engaged in the study of the chemotherapy of trypanosomiasis. Writing under a motto (in German) to the effect that " You ought to be frightfully careful," and beginning with the remark that " the history of the experimental therapy of the trypanosomiases is a concatenation of disappointments," the present authors record their own observations with an unusual degree of caution ; while they openly deplore the fact that earlier accounts of similar experiments carried out in the neighbouring island of Sumatra [presumably the work of BAERMANN is referred to—see *Trop. Vet. Bull.*, Vol. 11, No. 1, p. 2] have raised false hopes regarding the efficacy of " Bayer 205 " as a cure for surra.

It is remarked, at the outset, that the efficacy of " 205 " in surra can be better studied in horses than in buffaloes, for the disease runs a much more chronic course in the latter animals, which often show—without specific treatment—long intermissions, with apparent recovery, between relapses. During the intermissions trypanosomes are so scanty in the blood that they may be undiscoverable, and consequently the effects of drug-treatment are very difficult to determine exactly. The horse, in which the disease is acute and usually brief, is a much more suitable animal for experiment ; and the authors do not disguise their scepticism regarding the alleged " cures " which have been reported in buffaloes, and in other animals showing similarly chronic infections. (They express the opinion, indeed, that the action of " 205 " upon surra in the buffalo can only be ascertained properly by experiments on a large scale—not by studying its apparent effects on individual animals ; and they state that mass experiments directed to this end are now in progress in Java. The probable outcome of this work, however, is not indicated.)

A brief account of the clinical manifestations of surra in the horse —as seen in Java—is given. The authors note, as characteristic symptoms, that the animal becomes slow and heavy, shows weakness or even paralysis in the hindquarters, and often develops an oedematous condition of the limbs, breast, or belly. The temperature rises to 39° or 40° C., and the pulse becomes very rapid—the heart-beat being much augmented. The nasal secretion is increased, and may be purulent. Eye symptoms are also common—mucus in the corners, the conjunctivae swollen and reddened and sometimes jaundiced, with occasionally iritis and keratitis. Albumen is constantly present in the urine. In later stages the animal becomes increasingly lethargic, and stands with half-closed eyes and dropped head. It becomes rapidly emaciated, and finally falls down and dies. The appetite usually remains good till near the end. The disease lasts for 3–4 weeks if the spinal cord is infected : in other cases the horse may survive for 7–8 weeks. [It is important to bear these symptoms in mind when studying the tables showing the effects of treatment.]

Earlier experiments upon laboratory animals had indicated that " 205 " was possessed of high trypanocidal efficacy, but very low toxicity for the vertebrate host—some observers even putting the ratio of curative to toxic dose as high as 1 to 167. Very successful results had also been previously recorded in the treatment of dourine in horses, and the present authors therefore had good grounds for expecting that " 205 " would prove efficacious for the cure of surra in the same animals. It is clear, however, that they have shared in the disappointments of their forerunners.

In the first place they found, unexpectedly, that "this medicament is very toxic for the horse"; so much so, in fact, that they are "still unable to estimate"—at the end of their observations—the relation between toxic and curative dose, beyond making the general affirmation that these doses "lie very near together." This is a significant conclusion, which appears to be fully borne out by their observations; and it leads them to conclude, further, that "the employment of very large doses, which would definitively destroy the parasites, is therefore excluded." Moreover, they find that smaller doses of the drug given repeatedly "are likewise unemployable," for they produce a cumulative intoxication while, at the same time, they fail to get rid of the parasites and to prevent relapses.

The toxic effects of "205" upon the horse are described at some length, and are repeatedly referred to in the accounts of individual cases. Typically they are as follows: First, a severe urticaria, often over the whole body. Later, a coating of the mucous membrane of the tongue and lips, gradually resolving itself into localized erosions. The animal dribbles or foams at the mouth, its breath is fetid, and it loses its appetite and becomes emaciated. The rectal mucous membrane is often severely affected—proctitis, periproctitis, and even abscess-formation, having been observed in this region. Dermatitis, with tenderness of the skin and perhaps loss of hair, appears to be a usual symptom. It is commonly localized in the legs, and especially just above the hoof, where it takes the form of a severe pododermatitis involving the coronet. The hoofs become hot, and painful on pressure or percussion. There is a rapid loss of condition, and the horse soon becomes unable to stand. It then lies down and dies, or, if it happens to survive, recovers very slowly. After recovery curious rings are seen on the hoofs, having the appearance of ridges or thickenings running parallel with the coronet. (These are shown photographically in figs. I and II.) A distinct ring appears after every dose of "205" administered, and "even with the smaller doses ring-formation is not altogether absent, so that one can read off directly on the hoof, by the number of more or less well-marked rings on it, the number of injections given and the length of the intervals between them." These symptoms are produced by "205" not merely in horses suffering from surra, but also in normal healthy animals. (Experiments were made to determine this point, as the Bayer firm—to whom these results were communicated in a confidential report—apparently refused to believe at first that the drug could produce such serious effects on healthy horses.)

Post-mortem findings are recorded from only one animal—Horse 478, a healthy Javanese pony of 130 kgm., which received 5 gm. of "205" intravenously, and succumbed in nine days. At death the coronets of all four feet were greatly swollen. The lips were acutely inflamed and the mouth and pharynx covered with a whitish yellow coat, while the tongue and oesophagus showed definite erosions. The heart-muscle presented "a cooked appearance." The stomach and intestines were much inflamed, and there was severe proctitis. The bladder was very hyperaemic; the "liver degenerated, kidneys ditto." [Unfortunately nothing else is said anywhere regarding the effects of "205" on the kidneys.] It was found that both native ponies (from Java and the Sunda Isles) and large Australian horses were susceptible to "205"—the latter, apparently, being intolerant of even quite small doses. As a rule the drug appears to have been administered subcutaneously or intravenously: but it is noted (p. 62) that one horse (No. 431) received two successive doses of 3 gm. each *per os*, the result being

unsuccessful; and it is remarked incidentally (p. 64) that administration by the intrathecal route was out of the question, owing to the severity of the disease in its acute stages.

Details of treatment of 21 horses are shown in a series of instructive tables—too elaborate for reproduction here—which are further elucidated in the text. From the information recorded it is apparent that almost every animal—including even those which received small doses of the drug—showed definite symptoms of more or less severe intoxication; while in the whole series only three appear to have been cured (Nos. 418, 448, 414), though one other (No. 415) was still alive and also possibly cured at the time of writing. No matter how the drug was administered—whether in one large dose or in successive smaller doses—the results appear to have been equally disappointing. Sometimes the animals died after two or three weeks; at other times they recovered temporarily, then relapsed, were retreated, again relapsed—and so on, sometimes several times in succession—but ultimately died, or were killed *in extremis*. The following cases selected at random will serve as illustrations of the results generally :—

No. 402. Weight, 122 kgm. Received 5 gm. "205" at one dose. Relapsed after 26 days : died 15 days later.

No. 352. Horse of 373 kgm. Received 7·95 gm. at one dose. Died after 17 days.

No. 442. Pony, 176 kgm. Received altogether 15 gm., given in doses of 0·5 gm. every other day. Relapsed, and was killed *in extremis* some five weeks later.

No. 435. Horse, 385 kgm. Received (approximately) 1 gm. every four days till 11 gm. had been administered. Relapsed, and received a single dose of 3·7 gm. Relapsed again, and received a further dose of 3·7 gm. Subsequently killed *in extremis* about four weeks later.

No. 423. Pony, 126 kgm. Received 0·25 gm. every other day. Treatment stopped (owing to intoxication) after 7 gm. in all had been given, but begun again after lapse of 14 days and continued till 15 gm. in all had been administered. Relapsed four weeks later, and was killed.

No. 439. Weight, 170 kgm. Received 1·7 gm. (*i.e.*, a dose of 1 gm. per 100 kgm. body weight—as recommended for treatment of dourine). Relapsed after 14 days. A similar dose (1·8 gm.) again given, again followed by a relapse. Retreated with same dose and same result four times successively. Finally killed *in extremis*.

In all the foregoing cases more or less severe toxic symptoms were manifested. Most of the horses treated were naturally infected, and in early stages of the disease; but two (Nos. 405 and 232) were experimentally infected animals, and these likewise showed signs of intoxication—though they received altogether but 4 gm. each, in broken doses—and finally died. (The authors state that it was to be expected, from previous results, that artificially infected animals would be more easily curable, though the event did not bear this out.)

Below are a few details concerning the three horses that were probably cured :—

No. 418. Weight, 216 kgm. Received 5 gm. at one dose. At the time of treatment this animal displayed no symptoms of surra, though trypanosomes were present in its blood. Apparently cured : in good condition 10 months later. No trypanosomes discoverable in blood—microscopically or by subinoculation.

No. 448. Weight, 175 kgm. Received 5 gm. at one dose. Symptoms of surra present; moderately severe case. Apparently cured, and in excellent condition, some five months later.

No. 414. Weight, 166 kgm. Just recently sick. Received 0·5 gm. every other day, until 10 gm. in all had been given. Apparently cured: free from parasites and had increased in weight 11 months later. This animal, unlike the others, showed no toxic symptoms.

It was found that the administration of "205" did not cause the trypanosomes to disappear from the peripheral blood immediately. To ascertain whether the persistent trypanosomes were still infective, samples of blood were taken every five minutes after injection of the drug, and inoculated into guinea-pigs. As a result, it was found—in three recorded experiments—that the trypanosomes, though still present, had lost their infectivity for guinea-pigs in 15, 20, and 25 minutes after the horses had received injections of 5, 3, and 2 grammes of "205" respectively. Considering the minute amount of the drug which the guinea-pigs could thus have received along with the trypanosomes, the authors observe that "this argues strongly in favour of a direct action [of '205'] upon the trypanosome cell." Morphological study of the trypanosomes during the period of their persistence revealed no evidence that the drug acts by inhibiting division of the parasites—as some previous authors have maintained.

At the end of their paper the authors describe experiments designed to test whether *T. evansi* can acquire a resistance to "205" as a result of the administration of a sub-curative dose to an infected horse. These experiments appear to answer the question in the affirmative; for it was found that guinea-pigs and white rats, infected from untreated horses, were curable with doses of "205" which were unable to cure infections in similar animals experimentally infected with the blood of treated horses. Moreover, since the blood of a treated horse remains infective for so very short a time after treatment (as noted in the preceding paragraph), the authors feel justified in concluding that resistance to "205" must be acquired by the trypanosomes almost instantaneously, and that resistant races must arise by a process of natural selection.

An attempt was made to immunize a horse (No. 404) by the simultaneous injection of trypanosomes and "205," the animal subsequently receiving repeated inoculations with trypanosomes alone, in order to test its resistance. "The result was that the horse finally died of surra; and from this we believe it can be inferred that it will not be possible to immunize an animal in this manner. But the fact that 3 grammes of '205' apparently sufficed to protect a horse of 85 kgm. during 2½ months against the consequences of seven subsequent inoculations [with trypanosomes], and that only the eighth inoculation after 11 weeks was successful, speaks strongly, in our opinion, in favour of the drug having a prophylactic action of long duration and practical utility."

Experiments were also made to determine "how long after infection has actually occurred the drug can forestall its effects." The results—exhibited in three tables—were inconclusive; but the authors feel justified in concluding from them "that it is possible, by the injection of non-toxic doses of '205' during the first days of the incubation period, to inhibit the outbreak of the disease."

Reviewing all their results, the authors finally conclude that a horse may be cured of surra by a single large dose of "205"—about 5 gm. per 200 kgm. body-weight—or by a series of smaller doses. In the

latter case they recommend a dose of 0·5 gm. per 150 or 200 kgm., given every other day until a total of 10 gm. (or, if possible, 15 gm.) has been administered. The recorded results, however, give little ground for optimism regarding the outcome of such treatments ; and the authors themselves point out that with such dosage " disappointments due to the toxicity of the drug cannot be avoided," though the intermittent method is the less dangerous. They add that " these two methods have a chance of succeeding in those cases only in which the disease is still in an incipient stage, and when clinical symptoms are absent or have only just made their appearance. The sooner treatment is begun, the greater is the chance of cure." " In animals which already show typical clinical symptoms, or which have already been ill for a long time, treatment is useless." " With the appearance of a relapse, all further treatment is destined to fail."

Upon the results of their investigations the authors also base a number of administrative recommendations, of which the following are the most important : All animals suffering severely from surra should be slaughtered, since they are incurable with " 205." All animals in early stages of the disease should be treated by one or other of the methods mentioned in the foregoing paragraph. All animals which relapse after such treatment should be killed, " since further treatment is useless and there is a fear that resistant strains [of *T. evansi*] may be produced." All animals in the vicinity—including buffaloes—which are suspected of being infected, should receive a prophylactic injection of " 205 " (1 gm. for every 150 kgm. body-weight), to be repeated after four weeks. Whenever possible, all animals should be confined in fly-free stalls, to prevent the spread of infection and the possible dissemination of drug-resistant strains of the trypanosome.*

PATAKI (P.). **Zur Behandlung der Beschälseuche.** [The Treatment of Dourine.]—*Arch. f. Wissensch. u. Prakt. Tierheilk.* 1923. Feb. 10. Vol. 49. No. 4/5. pp. 108–191.

The author gives details of treatment of a number of naturally contracted cases of dourine.

The administration of Bayer " 205 " in doses of 0·01 gm. per kg. body-weight causes the disappearance of trypanosomes from the mucus of the vagina and urethra ; plaques and other localized evidences of infection disappear, but localized or diffuse swelling, or even necrosis of the skin, may result from the injection of the drug. In many cases there may be evidence of inflammation of the coronets.

In an experiment with atoxyl and tartar emetic a naturally infected mare, which showed plaques and other lesions, including incoördination, a dose of 3 grammes of atoxyl in 5 per cent. solution intravenously was first given. The visible lesions disappeared and no trypanosomes could be found in the vaginal mucus. A week later 2 grammes of tartar emetic in 2 per cent. solution were given intravenously. After a further week 4 grammes of atoxyl were administered, and this was followed by a second injection of emetic a week later.

All symptoms disappeared, and two months later the complement fixation test yielded a negative result.

A mare which had shown clinical evidences of infection, and had previously been unsuccessfully treated with antimony trioxide, was given two months later three intravenous injections of 4 grammes of

* Summarized by Mr. Clifford DOBELL, F.R.S.

atoxyl each in 5 per cent. solution. Two months later the blood test, which had previously been positive, gave a negative result, and the animal was put to light work. Death occurred shortly afterwards from broncho-pneumonia.

Antimony trioxide, which is not soluble in water, was injected as a suspension into the jugular vein of two animals infected with dourine, but without effecting any improvement in them.

IWANOW (E.) **A Contribution to the Biology of** *Trypanosoma equiperdum.—Parasitology.* 1922. Dec. Vol. 14. Nos. 3 & 4. pp. 315–319.

It has been firmly established that dourine is transmitted almost exclusively through coitus, but it should be noted that infection does not necessarily occur in all cases of coitus with infected animals, but only in two-thirds or three-quarters of the instances.

The object of the author's experiments was to ascertain whether *T. equiperdum* passed into the sperm, and, if so, whether it was capable of penetrating the intact mucous membrane of the female genital tract ; for these experiments mice, rabbits and dogs were used.

It was found that in mice the contents of the vesicula seminalis remained free from *T. equiperdum*, even when parasites were abundant in the blood, and similarly that the trypanosomes did not pass into the sperm of the dog. With a view to discovering whether *T. equiperdum* could traverse the intact mucous membrane, infected blood diluted with normal saline was introduced into the vagina by means of a very fine elastic catheter lubricated with vaseline : two series of experiments were undertaken : (1) care being taken to avoid any excoriation of the mucous membrane (eight mice and four rabbits), and (2) with the mucous membrane of the vagina scratched, so that blood appeared (three mice and one rabbit). It was found that none of the first series of animals became infected, but all of the second series.

These experiments which were performed in 1917, were repeated in 1922, with another strain of *T. equiperdum* obtained from MESNIL : the results were similar.

The author explains the transmission of *T. equiperdum* amongst horses during coitus by the fact that this is often accompanied by slight abrasions of the genital organs. With regard to the control of the disease, he recommends that attention should first of all be directed to the methods of preventing possible wounds and abrasions in the mucous membrane of the genital organs of horses during coitus. He adds :—

" Horses should not be allowed to breed promiscuously in the herd, but should be covered individually under control, which allows of taking care that the external genital organs are clean during coitus, that the penis does not get scratched by the hairs of the mare's tail. The external genitals of the mare should be washed and her tail carefully dressed before the act. Then, to facilitate coitus it is advisable to lubricate the external genitals of the mare and the penis of the stallion with vaseline or oil."

VLADESCO (R.) & IRIMINOIU (Gh.). **Sur l'action thérapeutique du trépol dans quelques trypanosomiases.**—*C.R. Soc. Biol.* 1923. Feb. 3. Vol. 88. No. 4. pp. 287–288.

Guinea-pigs infected with *T. equiperdum*, nagana, or surra, were treated with trépol [bismuth compound], the dose given being 1–1·5 cc. Intraperitoneal injection was followed almost immediately by the disappearance of parasites from the blood, but the animals died

invariably from peritonitis. Intramuscular and subcutaneous injection caused disappearance of parasites, but relapses occurred in from 16–23 days. In all guinea-pigs injected with trépol, hepatitis and nephritis were found post-mortem.

LEFROU (G.) & OUZILLEAU (F.). **Essais du tryparsamide dans le traitement de la maladie du sommeil.** [Tryparsamide in the Treatment of Sleeping Sickness.]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 802–805.

Intravenous injection is less effective than subcutaneous administration. In one case a subcutaneous injection of 2 grammes [*i.e.*, 0·04 g. per kilog] produced sterilization which lasted a year. On the other hand, the sterilization following half that dose lasted in one instance only 84 hours.

Unfortunately 2 grammes appears to be about the maximum safe dose which can be administered subcutaneously, and even this produces a severe local reaction.

The drug does not appear to be superior to atoxyl.

BLANCHARD (M.) & LEFROU (G.). **Le traitement de la maladie du sommeil par le " 189."** [The Treatment of Sleeping Sickness by means of " 189."]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 797–802.

A single injection of a moderate dose of the drug causes only a brief clearance of the peripheral circulation.

A single large dose administered in the same way produces a more marked effect, but the local reaction is so severe as to preclude the administration of such doses.

A series of doses produces sterilization of some duration, but the cases have not been under observation sufficiently long to permit of any opinion as to the permanence of the cure.

Administration of the drug *per os* is useless, and it is without effect during the second phase of the disease. It sometimes produces lesions of the optic nerve.

SERGENT (Edm.) & DEGUILLAUME (A.). **Tableau généalogique d'un trypanosome du dromadaire conservé 4 ans par passages sur cobayes. Augmentation de sa virulence.**—*Bull. Soc. Path. Exot.* 1922. Dec. 13. Vol. 15. No. 10. pp. 947–951. With 1 fig.

The authors have followed the modification in the virulence of *T. berberum*, isolated from a dromedary, during its passage through guinea-pigs. The conclusions are :—

1. The virulence of *T. berberum* for guinea-pigs becomes increased as a result of repeated passage through these animals.

2. The increase in virulence appeared suddenly at the nineteenth passage, two and a half years after the inoculation of the first guinea-pig.

3. It has not varied appreciably from the 19th to the 55th passage during one and a half years.

4. The mean duration of the infection was, in the first 19 passages, 73 days, with 154 days of amplitude of variation. In the remaining 36 passages, the average was 18 days with 46 days of amplitude of variation. Consequently, the trypanosome acquired an exaltation of virulence at the 19th passage and has maintained this during the following 36 passages.

FRANCHINI (G.). **Action du latex d'Euphorbes sur différents trypanosomes. Culture de flagellés dans des latex divers.** [The Action of the Latex of Euphorbiaceae on Different Trypanosomes. Cultivation of Flagellates in Various Forms of Latex.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 41–50.

The author has recently reported the occurrence of trypanosomes in the latex of various Euphorbiaceae, which he considers are in all probability trypanosomes of insects. Interest therefore attaches to the possible effects of such latex upon trypanosomes derived from man and animals.

Details are given of experiments in which *T. evansi, T. soudanense, T. brucei, T. lewisi,* and *T. gambiense* were used for this purpose. In each case controls with normal salt solution, and citrate solution were used.

Latex from eight species of Euphorbia was used. The mixtures were made on slides and covered with large cover slips. The slides were then placed in a moist chamber at 26° C.

The trypanosomes were found to retain their vitality longer in the latex than in the control solutions. *T. lewisi* survived the longest, then *gambiense* and *brucei,* with *evansi* and *soudanense* last. It is probable that the multiplication of bacteria after the first 24 hours affected the vitality of the trypanosomes adversely. Further experiments were made regarding the cultivation of flagellates in mixtures of broth and latex and in latex sterilized in the autoclave.

The flagellates used were *Herpetomonas pyrrhocoridis, H. chamaeleonis, H. ctenocephali, H. tarentolae,* cultures of Oriental sore and canine leishmania. The trypanosomes were *T. gambiense* and *T. lewisi.*

H. pyrrhocoridis multiplied in nearly all the kinds of latex used. The samples of latex used in these experiments were obtained from a larger variety of plants than in those described above.

H. chamaeleonis in general grows well.

H. ctenocephali did not multiply in any of the samples used.

In some cases *H. tarentolae* grew well.

The cultures of Oriental sore grew well in the latex of *Elaeophorbia drupifera.*

T. lewisi grows in different samples of latex and the change into the crithidial forms takes place more quickly than in N.N.N. medium and blood broth. But vitality is not maintained for long in any one tube.

T. gambiense maintains its morphology and mobility for a short time only. After several days leishmaniform parasites are found.

Some of the flagellates show very pronounced changes in morphology. The flagellates of Oriental sore in the latex of *Elaeophorbia drupifera* became very large and rounded. They show several nuclei, and several centrosomes with or without flagella. *H. pyrrhocoridis* in latex of *E. calyculata* and to some extent in *Alstonia scholaris* show an oval dilatation at the anterior end, and the body is sometimes coiled in a helical manner.

The experiments are held to show that certain flagellates are capable of living and multiplying in the latex of plants.

SERGENT (Edm.), PARROT (L.) & HILBERT (D.-N.). **Morphologie de piroplasmes observés en Algerie chez le mouton** (*Gonderia ovis*). [The Morphology of Parasites found in the Blood of Sheep in Algeria (*Gonderia ovis*).]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 789–792. With 1 text fig.

The proportion of corpuscles invaded by parasites appears to vary in different parts of the circulation. In the peripheral blood the authors

found eight per thousand corpuscles invaded, in the heart blood the proportion was three per thousand, and in the blood from the liver 220 per thousand.

" Koch's bodies " have not been found in any of the internal organs. The figure shows the various forms of the parasite encountered. The smallest parasites resemble anaplasma, other forms recall those found in *Gonderia mutans* of cattle, including the cruciform type. The type most frequently encountered was ring-shaped.

SERGENT (Edm.). **De l'association des différentes piroplasmoses entre elles, à propos du prétendu *Piroplasma annulatum* Dschunkowsky et Luhs 1904.** [The Relationships of the Various Piroplasmoses among themselves.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 23–30.

The author summarizes the types of piroplasmoses at present recognized as follows :—

(1) Due to *Piroplasma bigeminum* and *Babesia bovis.*
(2) Due to *Gonderia mutans.*
(3) Due to *Theileria parva.*
(4) Due to *Anaplasma marginale.*

And adds another without specifying the causal organism, but refers to a disease which he described with VALLERY-RADOT and LHÉRITIER as " bilious haemoglobinuric jaundice."

The study of these diseases is complicated by the frequent occurrence of more than one type of infection in an animal at the same time. The author is of opinion that the species *Theileria* (*Piroplasma*) *annulata* should be removed. It has been thought that the parasite described by DSCHUNKOWSKY and LUHS should be classed as of the mutans type, because, in spite of its morphological resemblance to *T. parva*, it was found to be transmissible by blood inoculation (TARTARKOWSKY).

The recent discoveries by CARPANO and DONATIEN, PLANTUREUX, ROSSI, and ESPERANDIEU, that diseases due to parasites morphologically resembling *Theileria parva* in all respects are sometimes transmissible by blood inoculation owing to the presence in the blood of parasites with the characters of " Koch's bodies," render valueless the non-inoculability by means of blood of *Theileria parva* as a feature distinguishing it from *Gonderia mutans.*

Sergent proposes that the terms " Tropical piroplasmoses " and " Mediterranean Coast Fever " used by DSCHUNKOWSKY and LUHS and CARPANO should be dropped, and that the diseases should be named according to the parasites found. Thus, the disease studied by CARPANO, which from his description appears to have been a mixed infection, should be called " a triple infection due to parva, mutans, and anaplasma."

In describing cases of piroplasmosis it must always be borne in mind that there is possibly and very probably a mixed infection.

DONATIEN (A.), PLANTUREUX (E.), ROSSI (P.) & ESPÉRANDIEU (G.). **La Theiléríose bovine en Algérie.** [Bovine Theileriasis in Algeria.] —*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 6–10.

Up to the present the existence of African Coast Fever has not been definitely established in Northern Africa, although SERGENT and LHÉRITIER recorded the occurrence of bodies resembling Koch's bodies in the spleen and glands of animals affected with jaundice.

In the course of an enquiry into cases of jaundice in bovines in Algeria, which was carried out during the summer of 1922, the authors encountered a parasite possessing all the morphological characters of *Theileria parva*, and also succeeded in transmitting the disease experimentally. The disease occurred in a number of more or less marshy districts between the middle of June and the middle of September. Animals between the age of 18 months and two years were attacked, and both crossbreds and country-breds were infected. The disease in the latter was less severe.

The disease was always acute. The symptoms were in general those of a febrile disease. There was swelling of the eyelids and discharge from the eyes. The conjunctiva was pale or stained yellow, and in some cases showed petechiae.

Diarrhoea was frequently observed, and in some cases was complicated by dysentery.

In cases which ran a prolonged course the blood became pale and watery. The superficial lymphatic glands were enlarged and painful. Haemoglobinuria was a frequent symptom.

The duration of the disease ranged from 7–10 days, and when recovery occurred it took place rapidly, but attacks frequently proved fatal.

The lesions were, a variable amount of yellowish or pink serous fluid in the abdomen, enlargement of the spleen—sometimes enormous, —gelatinous oedema around the enlarged glands, which were sometimes ecchymosed ; punctiform haemorrhages in the bone marrow ; ulceration and ecchymoses of the mucous membrane of the fourth stomach ; evidence of acute haemorrhagic enteritis of the small intestine. The liver was enlarged and icteric, and the gall bladder distended with thick brownish bile.

The kidneys showed marked congestion. As already stated, the blood and lymphatic glands contained parasites indistinguishable from those of East Coast Fever. The authors confirm an observation made by CARPANO in Eritrea that plasma bodies may be found both free or within large mononuclear leucocytes in the peripheral circulation. This was usually in severe and fatal cases.

A calf from an unaffected region was inoculated with 100 cc. of blood from an affected heifer. Koch's bodies were discoverable in the blood used. Infection resulted. This calf formed the starting point of a further series of inoculations, and four passages have been carried out.

From these experiments it was observed that when Koch's bodies occur in the circulating blood prognosis is bad, and further, that in cases in which these bodies are very scantily present in the superficial glands, they may be present in large numbers in other organs.

The authors conclude that in spite of the occurrence of jaundice and haemoglobinuria, in some cases the disease is, in view of the results of microscopic examination, etc., in reality a form of Theileriasis.

LEGER (M.) & BÉDIER (E.). **Piroplasmose à *Gonderia mutans* chez les Bovidés du Sénégal.** [Piroplasmosis due to *Gonderia mutans* in Bovines in Senegal.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 60–62.

The author records the discovery of a parasite of the Gonderia type in a two-year-old bullock. A search for Koch's bodies in the glands and organs failed to reveal any.

The animal was heavily infested with *Amblyomma variegatum* and *Hyalomma aegyptium*.

SCHEIN (H.). **Piroplasmoses d'Indochine.** [Piroplasmoses in Indo-China.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 30–41. With 2 text figs.

The author criticizes investigations made by LAGRANGE [see this *Bulletin*, 1922, Vol. 10, p. 66] regarding the identity of piroplasms occurring in buffaloes and cattle, and quotes experiments which are held to establish the specific nature of the parasite of the buffalo.

VELU (M.). **Thérapeutique générale des Piroplasmoses.** [The Therapeutics of the Piroplasmoses.]—*Rev. Vét.* 1923. Jan. Vol. 75. No. 1. pp. 5–22.

This article is a brief review of the literature of the subject.

STEPHENS (J. W. W.). **A New Malaria Parasite of Man.**—*Ann. Trop. Med. & Parasit.* 1922. Dec. Vol. 16. No. 4. pp. 383–388. With 1 coloured plate.

This paper contains a description of the morphological characters of a malarial parasite detected in a patient in 1918. The characters presented appear to be different from those of any of the recognized species, and the author proposes the name *Plasmodium ovale.* It appears to resemble that described by Ahmed EMIN in 1914 as *Plasmodium vivax*, var. *minuta*, but the author has been unable to obtain his specimens for comparison.

SENEVET (G.) & WITAS (P.). **Evolution spontanée de l'infection à *Haemoproteus columbae*, chez un pigeon isolé à partir du premier mois de son existence.** [The Spontaneous Evolution of Infection with *Haemoproteus columbae* in a Pigeon kept completely Isolated from the Age of One Month.]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 787–789.

It has already been recorded by the SERGENTS and BÉGUET that gametes may disappear from and reappear in the circulation of infected pigeons, and these observations are confirmed by Senevet and Witas.

For a period of more than two years the authors have kept under close observation a pigeon which had acquired the infection before it came into their possession. Within a few days of the detection of the parasites they increased enormously in numbers and became larger. Shortly afterwards they decreased, and at the end of three months they were not discoverable in the blood. After a few days small parasites again appeared, and again an increase in number and size was noted. The numbers again decreased, and about six weeks later they had entirely disappeared from the circulation. During the next five months 90 examinations were made without any parasites being detected. Then young gametes appeared again.

In view of the long period during which parasites were not discoverable in the blood great caution must be exercised in deciding whether a bird is infected or not.

CARPANO (M.). **Sulla preparazione degli strisci di sangue da servire specialmente per la ricerca dei Piroplasmi.** [The Preparation of Blood Smears, particularly for the Detection of Piroplasms.]—*La Clin. Vet.* 1922. Nov. 15 & 30, Vol. 45. No. 15. pp. 639–645.

FRANCHINI (G.). **Sur un parasite leishmaniforme du sang du merle et sur quelques trypanosomes d'hirondelles.** [A Leishmaniform Parasite in the Blood of the Blackbird, and some Trypanosomes of the Swallow.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 11–14. With 1 text fig.

LIGNIÈRES (J.). **Sobre el problema de la Tristeza.** [The Problem of Tristeza.]—*Revista Zootécnica.* 1922. Oct. 15. Vol. 9. No. 109. pp. 288–296.

MARSH (H.). **Coccidiosis in Cattle in Montana.**—*Jl. Amer. Vet. Med. Assoc.* 1923. Feb. Vol. 62. No. 5. pp. 648–652.

DE MELLO (F.) & SUCTANCAR (C.). **Morphologie et cycle évolutif d'un Herpetomonas de l'intestin d'** *Hemidactylus brookei* **Gray.** [The Morphology and Developmental Cycle of a Herpetomonas of the Intestine of *Hemidactylus brookei* (Gray).]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 795–797. With 1 text fig.

ROUBAUD (E.) & FRANCHINI (G.). **Culture des parasites leishmaniformes obtenus chez la souris par inoculation des fèces de la Puce** *Ctenopsylla musculi.* [Cultivation of Leishmaniform Parasites obtained from the Mouse by Inoculation with the Faeces of *Ctenopyslla musculi.*]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 14–15.

THOMSON (J. G.) & ROBERTSON (A.). **A Case of Human Infection with** *Eimeria oxyspora,* **Dobell. 1919.**—*Jl. Trop. Med. & Hyg.* 1922. Dec. 1. Vol. 25. No. 23. pp. 369–371.

DISEASES DUE TO METAZOAN PARASITES.

CHORLEY (J. K.). **Tsetse Fly, Eastern Border, Rhodesia.**—*Rhodesia Agric. Jl.* 1922. Dec. Vol. 19. No. 6. pp. 680–682.

As the result of a survey the author concluded that at the time the survey was carried out tsetse-flies were not to be found along the eastern border of Rhodesia, and that it was doubtful whether there were any within a distance of 15 miles from the border in Portuguese territory. There appeared to have been a shrinkage in the fly belt since 1919, which was associated with a diminution in the number of cases of nagana among the cattle of the border farms.

The disappearance of fly from known belts is probably influenced by weather conditions which affect the movements of game and parasitism by other insects.

There appears to be a definite relationship between rainfall and the prevalence of nagana. Apart from the movements of game, deciduous forest may be unsuitable for fly during dry periods. In view of the absence of tsetse along the border, it appears to be probable that outbreaks of nagana are due to the mechanical transmission of the virus through the medium of flies other than tsetse. Most of the infected farms are within range of flies carried by animals or man from over the border. It is hardly probable that tsetses carried over the border would remain and infect herds over any length of time without being detected.

Stomoxys, Lyperosia, Tabanus, and Haematopota were found abundantly, and once the virus was introduced conditions would favour its spread.

JOHNSTON (T. H.). **Some Facts of Importance relating to Sheep Maggot Flies.**—*Queensland Agric. Jl.* 1922. Oct. Vol. 18. No. 4. pp. 272–276.

A more detailed account of the observations recorded in this paper is published (in conjunction with TIEGS) in the *Proceedings of the Royal Society of Queensland* (1922, pp. 77–104).

The species particularly studied were *Chrysomyia albiceps, C. varipes, Lucilia sericata,* Sarcophaga, *Aphyra nigra,* and short notes are given regarding some others. The paper includes an account of the work done in America in connexion with the range of flight of certain blowflies.

C. albiceps is more commonly known as *Pycnosoma rufifacies.* According to PATTON the larvae of this species in India prey upon the larvae of other species. Experiments have been planned with a view to ascertaining whether this observation can be confirmed in Queensland.

The period required for hatching ranges from about 16 to 21 hours according to the season. Larvae feed for about 4 to 5 days, save when infesting living animals, when the period may be shorter. After feeding the larva spends a prepupal period of from 1½–3 days (summer) to 10 days (winter) in finding a place where pupation may be effected. The pupal period ranges from 3–8 days during the warmer parts of the year to 10–20 days during the colder seasons.

Moisture greatly influences the period of pupation, metamorphosis occurring more rapidly under its influence.

Definite information cannot be given as to the interval elapsing between emergence from the pupa to oviposition, but probably 5–6 days are required. The number of batches of eggs laid, and the number of eggs per batch, cannot be stated, nor can exact information be given regarding the duration of life of the fly, but flies bred in captivity in Brisbane lived for 15 to 26 days. Flies generally live a shorter time during warm weather.

Chrysomyia varipes.—This fly frequents carrion. The life-history of this species approximates closely to that of the previous one, but the pupal stage would appear to be more prolonged, a period of 1–3 months being required in winter for this phase.

Lucilia sericata.—This name is accepted provisionally as designating the commonest species of fly found infesting carrion and refuse in Brisbane.

The life-cycle is as follows : Eggs hatch in 16–24 hours ; the larva feeds for 4–6 days ; 2–20 days are occupied by the prepupal period ; the pupal period requires 6–17 days. The extremes for summer and winter are given. Pairing takes place 6–10 days after emergence, and oviposition begins two days later. Specimens bred in captivity lived for 12–36 days in summer and winter.

Lucilia caesar.—It appears to be uncertain whether this fly occurs in Brisbane, although it has been reported to occur in Australia. In view of the fact that experiments carried out in America by BISHOPP showed that blow-flies may travel up to 15 miles from the point of release, the author holds that only concerted action can be of any value for the control of the pests. The main aim should be to deprive the flies of carrion and to attack them in their breeding-places. He thinks that the spraying of sheep with arsenic mixtures is of little value, because it is not sufficiently radical.

WARBURTON (Cecil). **The Warble Flies of Cattle,** *Hypoderma bovis* **and** *H. lineatum.*—*Parasitology.* 1922. Dec. Vol. 14. Nos. 3 & 4. pp. 322-341. With 3 text figs.

Although the Oestrid flies, *Hypoderma bovis* and *lineatum,* whose bionomy is here so well described, are not incident to the tropics, there are several good reasons for noticing parts of this excellent and well-documented paper in some detail.

Both these species produce during the summer months (in England) about 800 eggs, and attach them to the hairs of cattle—usually of the legs, and preferably of yearlings. The eggs give issue to minute spinulose larvae, which pierce the skin in their immediate locality, and after entering their host are, to speak loosely, lost for some time. During the autumn and winter months (in England), however, they are to be found again in the wall of the host's oesophagus, being now of a glassy semi-transparency and smoothness, except for spinules at the mouth and posterior spiracles. " How they reach this position is entirely unknown." From the oesophageal wall the larva works its way, either directly through the soft parts, or sometimes by way of the posterior foramina and the spinal canal, to the skin of the host's back, where it begins to form a cyst, or " warble," becoming now opaque, and spinulose on the ventral surface and losing its mouth-hooks. Having made a breathing hole through the host's skin, it lies in its cyst with its posterior spiracles applied to the opening, increases greatly in size by absorption of the inflammatory products of its presence and assumes its familiar shape. In the spring—mostly during May, in England—the full-grown larvae leave their host, the exit, which requires some effort, being made through the breathing-hole. The freed larva drops to earth and pupates, preferably in some hole. The pupal stage averages about five weeks.

As is well known, Hypoderma larvae sometimes attack man and make long and protracted wanderings under the skin before they become stationary in an inflammatory tumour. Two cases are here cited in some detail. In one—a boy 3 or 4 years old—the first signs of dermatitis were noticed near the sternal end of the right clavicle five months before the extraction of the living larva from the cheek : in the interval the larva had travelled down and up the chest, down one arm to the elbow, then up again and over the shoulder and part of the back, thence to the ear (which became much swollen), thence to the eyelid before passing down the cheek : its track was marked by a line of inflammation with occasional abortive pointings. In the other case an egg was laid on an experimenter's trousers. It hatched in eight days, and in an hour and three-quarters the larva had burrowed through the skin of the leg. In the fourth month afterwards it was located by swellings on the hip and abdomen, and in the same month some pain in swallowing indicated that it was in the gullet. Finally, in the fifth month, it was extracted from the mouth.

VAN SACEGHEM (R.). **L'oestre du mouton au Ruanda (Afrique Orientale).** [*Oestrus ovis* in Ruanda—West Africa.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 17–18.

The author records the occurrence of this parasite, and states that it is responsible for very serious losses.

He has found it in the bronchi in one instance.

Larvae removed from the frontal sinuses and kept in the laboratory yielded flies in 30 days.

CAMERON (H. E.). **Bot Anaphylaxis.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Dec. Vol. 62. No. 3. pp. 332–342.

In this paper are described some experiments which were carried out with a view to ascertaining whether a condition known by the name " jiggers " is really an anaphylactic condition due to the presence of bots in the stomachs of horses affected with it.

No definite results were obtained.

LANE (Clayton). **Some Bursate Nematodes from Indian and African Elephants.**—*Ind. Jl. Med. Research.* 1921. July. Vol. 9. No. 1. pp. 163–172. With 7 plates.

This paper deals with certain bursate nematodes collected from Indian and African elephants. All fall into the super-family *Strongyloidea* of the sub-order *Strongylata.*

The *Strongylidea* comprises two sub-families, the *Strongylinae,* Railliet, 1893 (sens. nov. et strict.), and the *Oesophagostominae* sub-fam. nov.

In elephants the *Strongylinae* are represented by *Equinurbia, Choniangium,* and *Deccrusia* ; the *Oesophagostominae* by *Murshidia, Quilonia, Amira,* and *Pteridopharynx,* Those described in this paper are *Pteridopharynx africana, Quilonia africana, Grammocephalus clathratus, Grammocephalus varedatus,* and *Bathmostomum sangeri.*

ROUBAUD (E.) & DESCAZEAUX (J.). **Deuxième contribution à l'Etude des Mouches, dans leurs rapports avec l'évolution des Habronèmes d'Equidés.**—*Bull. Soc. Path. Exot.* 1922. Dec. 13. Vol. 15. No. 10. pp. 978–1001.

A continuation of the study of the development and mode of transmission of the larva of *Habronema megastoma, H. muscae,* and *H. microstoma.*

The larva of *H. megastoma* develops in the Malpighian tubules of the larva of the house-fly ; that of *H. muscae* in the cells of the fat-body of the larva of the house-fly ; and that of *H. microstoma* in the fat-body of the larva of *Stomoxys calcitrans.* Whether the Habronema larvae are exclusively specific to these respective hosts is uncertain. When the larval worms are fully formed (the development in the first two species occupies a mean minimum of 16 days) they escape from the proboscis of the adult fly, in the same way as the larval *Filaria bancrofti* escapes from the proboscis of its mosquito nurse, on to some part of the equine host that affords the essential requisites of warmth and moisture. Even the larval *H. microstoma* escapes in this way, and is not inoculated by the Stomoxys nurse, since the parasitized labella of the Stomoxys are incapable of penetrating the skin. Experiments show that the larvae can do nothing with the skin of man, and little or nothing with the mucosae of laboratory animals ; the inference therefore is that they do not leave the proboscis of the fly except for an equine. The larvae do not necessarily leave a drowned fly, but if the corpse of an infected fly be warmed in water the larvae emerge not only from the proboscis of the fly but also from the inter-segmental cuticle of the abdomen, so that possibly the same thing may happen when a drowned infected fly is swallowed by a drinking horse. It seems certain that flies infected with Habronema larvae suffer to some extent.

The authors compare Habronema and Filaria from the evolutionary standpoint.

ALLEN (H.). **Treatment of Persistent Debility in Australian Horses due to Habronemiasis and Strongylosis by means of the Single Stomach Tube.**—*Vet. Jl.* 1923. Jan. Vol. 79. No. 1. pp. 24–27.

In the author's experience 60 per cent. of cases of debility are due to Habronemiasis, 20 per cent. to Strongylosis, and 20 per cent. to what he terms constitutional causes. He disagrees with those who hold that parasitic aneurisms of the anterior mesenteric artery are not the cause of colic.

When parasites are detected in the faeces of a debilitated horse it is starved for 36 hours, and the following mixture is introduced into the stomach by means of the stomach tube :—

Formalin	1–2 ounces
Spts. turpentine..	2–3 ,,
Aloes barb.	3 drams
Sodium chloride..	6 ounces
Ol. lini	1½ pints

This is placed in a bucket and stirred thoroughly with warm water ; the total amount is brought up to 2 gallons.

Purging begins after 12 hours, and may last all the third day. Bran mashes only are given till the purging ceases.

If improvement does not set in the treatment is repeated after 2–3 weeks.

In cases of Habronemiasis a course of treatment with arsenious acid is also given. Three or four courses of treatment, each lasting 6 days with intervals of 4–7 days, are given. The first dose is 5 grains and it is increased by 5 grains daily.

No untoward results have been obtained.

In cases of Strongylosis intravenous injections of atoxyl are given. Four injections of 10, 20, 30, and 40 grains of the drug in a pint of normal saline are given with an interval of 1 day between each. The course is repeated after an interval of 10–14 days.

Removal of dung from the neighbourhood of the horses is imperative. It should be removed to a distance and buried in pits.

HALL (M. C.) & SHILLINGER (J. E.). **Some Attempts to Control Strongyles in Aneurisms by means of Intravenous Injections of Drugs.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Dec. Vol. 62. No. 3.

Details are given of experiments in which extensive treatments with tartar emetic were given to horses affected with verminous aneurisms, and in one case a dose of carbon tetrachloride was given intravenously. The animals stood the injections of the emetic well, but 5 cc. of the latter drug produced alarming symptoms. It is not certain that the drugs affected the worms, as only one was found dead *in situ* ; all the rest were alive.

DE BLIECK (L.) & BAUDET (E. A. R. F.). **Tetrachloorkoolstof als Middel tegen Gastrophiluslarven, Ascaris, Strongyliden en Oxyuris bij het Paard.** [Carbon Tetrachloride as a Remedy for Gastrophilus larvae, Ascaris, Strongylidae, and Oxyuris in Horses.]—*Tijdschr. v. Diergeneesk.* 1923. Jan. 1. Vol. 50. No. 1. pp. 1–10.

This paper summarizes and discusses the results obtained by the authors in treating a series of horses with carbon tetrachloride (CCl_4) at the Veterinary Institute, Utrecht. The particular object of their investigation was to ascertain whether this medicament could be safely and advantageously employed in place of oil of chenopodium as a means of ridding horses of *Gastrophilus* larvae and intestinal worms—more especially Strongylidae.

After briefly reviewing previously published work dealing with carbon tetrachloride as a therapeutic agent—its toxicity, action, administration, etc.—the authors describe their own experiences. Most of their experiments were made on young animals, about a year and a half old, and the results of treatment of 14 of these animals are set out in a table. Before treatment the faeces of each horse were examined microscopically for worm eggs : the animals were then

treated with various doses of the drug: and afterwards their faeces were again examined—for worms and their eggs, and for *Gastrophilus* larvae—during the following four or five days. Finally, ten days after treatment, the animals were killed, and a post-mortem search was made for parasites in the stomach and intestines, and for worm eggs in the rectal faeces.

The authors emphasize the necessity of examining the faeces "for some time" after the administration of the drug; for they have observed that when eggs disappear from the faeces immediately after treatment, they may reappear a little later (*Ascaris*, Strongylidae). In explanation of this phenomenon it is suggested that some worms are only temporarily disabled, and not killed, by the drug, and subsequently resume their egg-laying activities. In other cases (*Ascaris*) the eggs appeared to become more numerous after treatment; and this was attributed to the disintegration of some of the parasites which had been killed by the drug—their eggs being thus liberated in the faeces. In confirmation of this supposition, it was found that such eggs were unripe, and incapable of development.

With adequate dosage of the drug the results appear to have been strikingly successful—especially in the case of Strongylidae and *Gastrophilus*. *Ascaris* infections, and *Oxyuris*, were also very considerably reduced, or completely cured. The following cases, extracted at random from the table, will illustrate the findings :—

No.	Examination of faeces before treatment.	Dose of CCl_4	Parasites removed.	Result of post-mortem examination.	Examination of faeces in rectum.
1	Eggs of *Strongylus* and *Ascaris* fairly numerous.	200 g.	Fairly numerous Stongylids, 11 *Ascaris*, many larval *Gastrophilus*.	No Strongylids, no Ascarids, no larvae of *Gastrophilus*.	No worm eggs.
5	Many eggs of *Strongylus*.	100 g.	Many Strongylids, very many specimens of *Oxyuris*, and fairly numerous larvae of *Gastrophilus*.	No Strongylids, no *Oxyuris*, 15 young larvae of *Gastrophilus*.	No worm eggs.
10	Fairly numerous eggs of *Strongylus*.	50 g.	Strongylids fairly numerous, many specimens of *Oxyuris*, and many larvae of *Gastrophilus*.	1 *Strongylus*, no *Oxyuris*, 5 young larvae of *Gastrophilus*.	No worm eggs.
14	Fairly numerous eggs of *Strongylus*, many eggs of *Ascaris*, eggs of *Strongyloides westeri*.	20 g.	Strongylids, 75 *Ascaris*, many larvae of *Gastrophilus*.	About 200 Strongylids, 30 *Ascaris*, 50 larvae of *Gastrophilus*.	Eggs of *Strongylus* and *Strongyloides*.

Carbon tetrachloride appeared to have little action upon *Strongyloides westeri*; but it was found to be "a powerful remedy against *Gastrophilus* larvae, *Ascaris*, Strongylidae, and *Oxyuris*." The authors recommend a dosage of 100–150 grammes for adult horses, and for foals 20–50 grammes (given either pure or as an emulsion—preferably the former). This amount is well tolerated, does not cause diarrhoea or other noteworthy symptoms, and does not put the animal off its feed. To obtain the best effect, the horse should be kept without food for 24 hours before treatment (in a bare stall—to prevent the animal eating its litter). Food may be given two hours after treatment, when the animal usually displays a good appetite.

The drug itself should be *purissimum**—free from sulphuric acid and phosgene. In this state no untoward results followed the administration of doses as large as 300 or even 400 grammes; but horses so treated passed loose faeces on the following day, and also showed loss of appetite for a couple of days afterwards. The post-mortem examinations (in the series already noted) revealed no gastric or intestinal lesions referable to the action of the drug, which appears to have no harmful effects upon the mucous membrane.

Owing to the large quantity of the drug which must be given at a dose, it is impracticable to administer it in the form of a bolus or in capsules, while there are various objections to the use of the bottle. It is also important that the drug should not be inhaled; and it is impossible to give it with the food or water. Accordingly, the authors believe that the only satisfactory way to administer carbon tetrachloride to horses is by means of an oesophageal tube with a funnel—the animal's mouth being kept open by a BAYER gag, or, still better, with the "mouth-dilator" used in England. They find this method simple and effective in practice, and briefly indicate the precautions to be taken, and details of procedure, in giving the drug by this route.

After treatment it is unnecessary to give a purgative, as in the case of oil of chenopodium. Another advantage which carbon tetrachloride has over this drug is its cheapness—its price being only about one twenty-third of that of oil of chenopodium (in Holland). It can also be obtained pure, and has a constant chemical composition; and as it was found to be highly efficacious, and quite safe when properly administered, it thus appears to be a valuable addition to the armamentarium of the veterinary practitioner.

It may be noted, in conclusion, that the authors of this paper refer to a new method, which is not generally known, for finding worm eggs in faeces. This method consists in emulsifying the faeces in an ERLENMEYER flask with water-glass (one part in two parts water) instead of with a saturated solution of common salt, according to the more usual procedure. Eggs which rise to the surface are removed and examined as in other flotation methods; but the advantage of the water-glass—according to the authors—is that fewer faecal particles rise with the eggs, and, as no salt crystals are formed, the preparation can be easily preserved after examination by merely adding a drop of glycerine to it. The method is one recently devised by SCHUCHMANN and KIEFFER (*Berl. Tierärztl. Wochenschr.*, No. 41, 1922), and was successfully used by the present authors in addition to the brine-flotation method.†

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* The authors note that the specific gravity of the pure drug (at 20° C.) is about 1·6, so that a dose of 100 gm. represents approximately 60 cc.

† Summarized by Mr. Clifford DOBELL, F.R.S.

MARTIN (O.). **Zur Entwicklungsgeschichte der *Filaria papillosa* Rud.** [The Development of *Filaria papillosa* Rud.]—*Berl. Tierärzt. Wochensch.* 1917. Dec. 6. Vol. 33. No. 49. pp. 523–524.

The author describes the finding of *Filaria papillosa* (males and females) coiled up under the peritoneum in horses, and gives measurements of the specimens found.

ADLER (S.) & CLARK (E. J.). **Intra-uterine Infection with *Ancylostoma caninum* in Dogs.**—*Ann. Trop. Med. & Parasit.* 1922. Dec. 30. Vol. 16. No. 4. pp. 353–354.

The authors have examined 13 dogs ranging from 2–15 days old. Worms were found in six of them.

Although infestation with *A. ceylanicum* is common in adult dogs in Sierra Leone no evidence of intrauterine infestation with this parasite has been obtained.

It is pointed out that infestation may take place in two ways : (*a*) *via* the blood-stream ; (*b*) from the maternal peritoneal cavity through the uterine muscle to the placenta. The detection of ankylostome larvae in the peritoneal cavity of experimentally infected guinea-pigs has already been established by YOSHIDA, and the authors have found ankylostome larvae in the peritoneal cavity of a guinea-pig placed for 10 hours in a vessel containing a mixed culture of *A. caninum* and *A. ceylanicum*.

NICOLAS (C.). **Contribution à l'étude de la Stéphanurose du porc.** [Stephanurosis in the Pig.]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. p. 819.

The author records the occurrence of *Stephanurus dentatus* in the pig in New Caledonia. While the flesh of infested pigs is fit for food the kidneys and the fat surrounding the urinary system should be rigorously excluded from diet and from lard.

SPARAPANI (J. C.). **Sur l'utilité de la recherche de l'antigène vermineux dans le jetage nasal de porcs atteints de broncho-pneumonie vermineuse au moyen de l'intradermo réaction.** [The Detection of Antigen in the Nasal Discharge of Pigs affected with Verminous Broncho-Pneumonia by means of an Intradermal Test.]—*Rev. Vet.* 1923. Feb. Vol. 75. No. 2. pp. 73–78.

The difficulties attending the clinical examination of pigs prompted the author to attempt to devise a material which could be applied to the diagnosis of verminous pneumonia by means of an intradermal test.

His liquid was obtained by the following technique :—

Nasal discharge is mixed with an equal volume of salt solution to make an even emulsion. The mucin is precipitated by the addition of 3 per cent. acetic acid in the proportion of four or five drops to 10 cc. The liquid is filtered to remove the mucin, neutralized with a 3 per cent. solution of potash and passed through a Berkefeld filter.

Details are given of three tests carried out upon animals affected with non-verminous broncho-pneumonia, and four with verminous broncho-pneumonia.

The exact nature of the reaction is indicated in one case only. The material was injected into the skin on the external surface of the ear. Twenty-four hours later there was an oedematous plaque, with a central deep purple area as large as a penny.

BALOZET. **Epizootie de gastro-entérite parasitaire et faune du tube digestif du mouton au Maroc.** [An Outbreak of Parasitic Gastro-Enteritis and the Fauna of the Alimentary Canal of the Sheep in Morocco.]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 820–824.

Parasitic gastritis was responsible for a widespread destruction of sheep during the winter of 1921–22. It is estimated that the losses amounted to 30 per cent. of the total number of animals.

A wet spring followed by a normal summer appeared to play an important part in the causation of the outbreak. The natives never collect food for their sheep, but leave them to forage for themselves. The delay in the fall of the rains in the autumn caused some degree of famine, which laid the animals open to the attacks of the parasites.

The author gives tables showing the percentage of animals (40 were examined) harbouring the various parasites found in the abomasum, small intestine, caecum, and colon, and showing the extent of the infestation in each case.

Eimeria arloingi and *E. faurei* were found, but these did not appear to be responsible for any disease.

Contrary to what might have been expected, *Haemonchus contortus* and *Nematodirus filicollis* were found with relative infrequence. The parasite most constantly and abundantly present was *Trichostrongylus vitrinus*.

Bunostomum trigonocephalum was found in the small intestine in 65 per cent. of cases. The importance of this worm lies in the severe injuries it causes not only to the mucous membrane, but even to the muscular coats of the bowel, as is evidenced by the haemorrhages it produces. The haemorrhages are more numerous than the worms, because they detach themselves from time to time and fix themselves in fresh situations.

Thymol in doses of 3–4 grammes ground to powder and mixed with 250 cc. of water was given by means of a tube, followed after an interval of some hours by sulphate of soda administered in the same way. No parasites were found in the faeces during the following 48 hours.

CAZE's mixture of oils of cade and turpentine in alcohol was inefficacious.

GRIFFITHS (J. A.). **Prenatal Infestation with Parasitic Worms.**—*Vet. Jl.* 1922. Dec. Vol. 78. No. 12. pp. 478–481.

The author refers to previous publications, and states that he has collected fully matured specimens of *Ascaris vitulorum* from calves dead on the tenth to fourteenth day after birth.

ALLEN (J. A.). **The Application of Vajda's Method to the Examination of Fox Faeces.**—*Jl. Amer. Vet. Med. Assoc.* Dec. 1922. Vol. 62. No. 3. pp. 349–352.

Parallel tests were carried out with 32 samples of faeces, using PEPPER's and VAJDA's techniques. The results are tabulated, and the conclusion is drawn that the latter method is at least as accurate as the former.

Modifications of VAJDA's method were introduced in that cones of waxed paper were used for the mixtures of faeces and glycerin, and the mixtures were allowed to stand for half an hour before preparations were

made. These modifications were made with a view to rendering possible the application of the method in the field.

In no case did subsequent centrifugation of the mixtures cause a change to be made in the diagnosis, although it led to concentration of the ova.

ANDERSON (C. W.). **Note sur les gîtes á Bullinus et à Planorbis de la Tunisie. Leurs rapports avec les Foyers de Bilharziose. Carte provisoire de leur répartition.** [The Localizations of Bullinus and Planorbis in Tunis. Their Relationship to Centres of Bilharziosis. Provisional Map of their Distribution.]—*Bull. Soc. Path. Exot.* 1922. Dec. 13. Vol. 15. No. 10. pp. 954–956. With 1 map.

DAUBNEY (R.). **Note on Helminths common to Man and Domesticated Animals.**—*Vet. Jl.* 1923. Mar. Vol. 79. No. 3. pp. 85–99.

FRANÇA (C.). **L'hôte intermédiaire du** *Schistosomum haematobium* **au Portugal (*Planorbis dufourii* Graells).** [The Intermediate Host of *Schistosomum haematobium* in Portugal (*Planorbis dufourii* Graells).]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 805–809.

GRIFFITHS (J. A.). **Nematodes as a Cause of Ophthalmia.**—*Vet. Jl.* 1922. Dec. Vol. 78. No. 12. pp. 471–477.

LARROUSE (F.). **Presence de** *Phlebotomus perniciosus* **Newst., dans le department de l'Oise.** [The Occurrence of *Phlebotomus perniciosus* in the Department of the Oise.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 16–17.

SCRJABIN (K. I.). **Parasitic Trematodes and Nematodes collected by the Expedition of Prof. V. Dogiel and I. Sokolov in British East Africa. Scientific Results of the Zool. Exp. to Brit. East Africa & Uganda.** 1914. Vol. 1. No. 4. pp. 99–157. With 10 plates. [In Russian pp. 3–98.]

SOUTHWELL (T.). **Cestodes from Indian Birds with a Note on** *Ligula intestinalis*.—*Ann. Trop. Med. & Parasit.* 1922. Dec. Vol. 16. No. 4. pp. 355–382. With 14 text figs.

BACTERIAL DISEASES.

DOYLE (T. M.). **Etiology of Equine Contagious Abortion in India.**—*Mem. Dept. Agric. in India.* Vet. Series. 1922. Oct. Vol. 3. No. 5. pp. 139–158.

In the author's experience contagious abortion in equines has not been complicated by retention of the placenta and metritis, as has been recorded by other investigators. The abortion appears to take place without difficulty, and without causing any evidence of ill-health in the mare.

Apart from the loss due to the abortion of immature foetuses, further loss is caused by the development of joint ill and death within a few days in full-time foals born of infected mares.

The author devotes some space to the literature regarding this disease.

His own investigations were directed to providing solutions to three questions :—

(1) The etiology of the disease.
(2) The identity of the causal organism with that responsible for equine abortion in Europe and America.
(3) Whether the same organism is responsible in pony and donkey mares.

The author finds that the organism is identical in all its characters with that described in England and America, and that it is responsible for abortion in both pony and donkey mares.

The morphological, staining, and cultural characters are described. Organisms from both sources cause the production of acid and gas with mannite, lactose (very small amount of acid and gas), glucose, galactose, levulose, and dextrose.

With glycerin there is a slight production of acid. Inulin gives neither acid nor gas.

It is noted that the organism grows in milk. The medium is not coagulated, and the " end of the reaction is alkaline."

A suspension of the organism in salt solution was killed in eight minutes at 60°, but it survived 45 minutes at 55° C.

Continued subcultivation causes a marked loss of virulence.

In naturally infected animals and animals inoculated intravenously the agglutination test has given most reliable results ; but in animals infected by way of the alimentary canal or vagina, the results have not been so constant.

" In those cases in which the test gave a negative result, the inoculation of culture tubes showed the infection to be localized."

A dilution of 1 in 400 is considered as the lowest dilution which can be considered positive. The highest dilution in which agglutination was obtained with normal serum was 1 in 200. Subcutaneous and intraperitoneal inoculation failed to infect guinea-pigs and rabbits so as to produce visible lesions ; 0·1 cc. of culture injected intravenously was fatal for rabbits in some cases. In the case of the rabbits and guinea-pigs inoculated subcutaneously and intraperitoneally no agglutination tests appear to have been carried out.

The period of incubation in pony mares following experimental infection is about 10 days, and in donkey mares 19 days.

Inoculation of foals with cultures failed to produce joint ill.

In two pony mares and in one donkey stallion arthritis developed as a result of intravenous inoculation.

ZELLER (H.). **Weitere Untersuchungen über das seuchenhafte Verwerfen des Rindes.** [Further Investigations regarding Contagious Abortion of Bovines.]— *Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1922. Dec. 30. Vol. 49. No. 1–3. pp. 65–116.

This long paper is in the nature of a summary of existing knowledge regarding the disease. It is divided into the following sections : (1) Distribution ; (2) Etiology ; (3) Cultivation and resistance of the bacillus ; (4) Diagnosis ; (5) The occurrence and demonstration of abortion bacilli and antibodies in milk ; (6) Natural methods of infection ; (7) Protective inoculation and treatment ; (8) The relationships between Bang's bacillus and the causal organism of Malta fever ; (9) The question as to whether Bang's bacillus is pathogenic for man. An extensive bibliography is included.

SUZUKI (T.) & IKI (Y.). **On the Causative Agent of Büffelseuche in Formosa and a Comparative Study of this and** *Bacillus bovisepticus.* —*Jl. Med. Assoc. Formosa.* 1922. Sept. No. 224. pp. 3–5. [English Summary.]

The authors conclude, as a result of their investigations, that *B. bubalisepticus* (ORESTE & ARMANNI) is quite distinct from *B. bovisepticus.*

SCHALK (A. F.) & RODERICK (L. M.). **Pathogenicity of** *Bacterium suisepticus* **for Hogs.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Dec. Vol. 62. No. 3. pp. 343–348.

A number of experiments were carried out in which strains of *B. suisepticus* were fed to pigs which were kept under grossly insanitary surroundings and on starvation rations with a view to determining their pathogenicity. All the strains used proved fatal to rabbits within 8 to 36 hours after inoculation.

Complete failure resulted in every case.

The authors believe that the part played by the organism in the production of swine pneumonia is quite a minor one.

NAINSOUTA. **Sur un cas de tuberculose observé chez un Zébu aux abattoirs de la ville de Dakar.** [A Case of Tuberculosis in a Zebu at the Slaughterhouse at Dakar.]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 868–870.

The author detected a caseo-calcareous lesion as large as a hazel nut in one of the bronchial glands of a zebu slaughtered at Dakar. The nature of the lesion was established by microscopic examination at the Biological Institute. No other lesions were found in any of the glands or organs.

It has been stated by CURASSON and TEPPAZ that the tubercle bacilli discovered by them in cattle were of the human type.

The author draws attention to the manner in which young animals which have lost their mothers are fed, if other animals refuse to suckle them. Milk is drawn into a bowl, and the owner fills his mouth repeatedly and ejects the milk into the mouth of the calf.

DISEASES DUE TO FILTERABLE VIRUSES.

POOL (W. A.) & DOYLE (T. M.). **Studies in Rinderpest.**—*Memoirs Dept. Agric. in India.* Vet. Series. 1922. Sept. Vol. 3. No. 4. pp. 103–137.

In the first portion of this paper a survey of the results obtained by the " serum alone " method is given. The results are expressed in the form of a graph. From this it may be gathered that during the last decade the number of outbreaks per annum in which serum has been used has risen to rather more than 6,000, the number of animals inoculated to some 800,000, and the number of animals dying of rinderpest has oscillated above and below 100,000.

The second point dealt with is the duration of the immunity conferred by this method.

Inaccurate knowledge of the period of immunity conferred by serum, combined with insufficient dosage for the animals dealt with, has led to a great deal of disappointment in the field.

In order to form an accurate opinion regarding the period of immunity conferred by serum certain factors must be known. The potency of the serum must be determined as accurately as possible, and the *minimum* safe dose fixed. The methods of injecting the virus and serum must be uniform. The virus used must be reliable. The test animals must be highly susceptible, and they must be protected from other rinderpest

infection while under test. Details of experiments designed to test the duration of immunity are given, and from these the conclusions drawn are :—

A single dose gave no protection after 14 days, and did not give complete protection after 10 days. A double dose did not protect completely after 18 days. A treble dose gave no protection after 32 days. A quadruple dose gave protection after 38 days.

In a second series of tests carried out with a different " brew " of serum the intervals elapsing between the dose of serum and virus were altered. These experiments showed that :—

(1) A single dose conferred complete protection for nine days ;
(2) A double dose failed to protect for 16 days ;
(3) A treble dose did not give complete protection for 24 days ; and
(4) Four doses failed to protect for 32 days.

The general conclusions are that a single dose will protect for nine days, and that increased doses prolong the immunity, but not in proportion to the doses.

Experiments are in hand to ascertain the maximum duration of immunity conferred by serum administered in any dose necessary.

The authors state that they have been able to confirm the view expressed by WARD & WOOD that antirinderpest serum is incapable of preventing the virus from invading the animal body. [These experiments are described in another part of the paper.]

In view of the determination of the period of immunity conferred by a single dose of serum, it is clear that attempts to control the disease in India by this method are doomed to failure. The large areas under the charge of single veterinary officers and the number of outbreaks reported make it quite impossible to repeat serum injections every ninth day. Apart from this, the question of cost would have to be taken into consideration.

The practice of mixing healthy with diseased after injection with serum varies in value with the degree of susceptibility of the animals. It is less valuable among those of low susceptibility than among highly susceptible animals, for the reason that the disease spreads more slowly and its spread in a herd may continue after the lapse of the serum immunity.

An opportunity occurred at Muktesar of testing the immunity acquired by mixing healthy and diseased animals after injections of serum had been given. An accidental outbreak of rinderpest occurred in an out-kraal containing highly susceptible hill cattle. Serum was immediately injected at the maximum rate (90 cc. per 600 lb. body-weight), and the animals were kept together. Two months later they were brought into the sheds to serve as virus producers and only 5 per cent. reacted. [The actual numbers involved are not stated.]

The second portion of the paper deals with the "serum-simultaneous" method of inoculation.

This method is the best for a country like India, where the disease is enzootic. When it is used for stamping out an outbreak the objection that the use of the virus may lead to further cases of infection falls to the ground, because the virus is already in existence. That objection does, however, stand to some extent when the method is applied in the absence of any outbreak.

Apart from the intrinsic value of the method, it would be easier to carry out and would reduce the amount of work (which is often fruitless) of the veterinary staff, and would thus enable them to cover their own ground more efficiently.

One of the chief difficulties would be the provision of suitable virus, but this the authors think could be got over.

Piroplasmosis is one of the chief factors in connexion with the risks attaching to the injection of virulent blood, and it has long been realized that the piroplasmoses of cattle in India urgently require investigation.

As SHILSTON showed, the difficulty of transmitting piroplasmosis can be largely overcome when very virulent virus (from hill bulls) is used, by storing the blood for some (eight) days before it is used. By this time the piroplasms are dead, but the virus is still active. This does not hold good in the case of weaker viruses.

In the early days of simultaneous inoculations serious set-backs were experienced through the administration of too small doses of serum. This was sufficient to label the method as dangerous. It was considered that the degree of immunity conferred depended upon the severity of the reactions obtained. HOLMES showed that with single, double, and treble doses of serum combined with virus immunity lasting up to three months (and possibly more) could be conferred.

The authors have carried this line further, and details of experiments are given from which the conclusion is drawn that there is no necessity to establish any relationship between the dose of serum and the dose of virus, provided a safe dose of the former is given.* In other words, further evidence is produced that serum will not prevent infection, although it may smother the clinical evidences of it.

VAN SACEGHEM (R.). **Rapport sur le Fonctionnement du Laboratoire de Bacteriologie vétérinaire de Kissengnie (Ruanda) en 1921.** [Report of the Veterinary Bacteriological Laboratory, Kissengnie (Ruanda) for 1921.]—*Bull. Agric. Congo Belge.* 1922. June. Vol. 13. No. 2. pp. 346–357. With 3 text figs.

The author details the method by which he hyperimmunizes animals for the production of antirinderpest serum. The subcutaneous injection of citrated or defibrinated blood was found to be unduly complicated and to produce a serum of moderate value only. Resort was therefore had to direct transfusion. The donor is placed in stocks about 4 ft. 6 in. above ground-level, and thus a good fall is obtained. The blood is passed from jugular to jugular through a rubber tube with a trochar on either end and an inspection tube of glass in the course of its length.

The method is described as simple and as giving rise to no complications. The serum, it is claimed, is superior to that obtained by the older methods.

Bleeding to the extent of three litres is practised on the tenth, fourteenth, eighteenth, and twenty-fourth days. The collecting vessels are allowed to stand for two days, and the serum is then poured off and carbolized to the extent of 0·5 to 1·0 per cent. The brews of serum are collected in vessels of 20-litres capacity. The serum is absolutely aseptic, and its injection has not been known to produce abscess formation in any instance. The author has never seen any anaphylactic symptoms during or after the process of transfusion provided the animals receiving the blood have been immunized not

* For some time prior to his death SHILSTON had been carrying out experiments on these lines. He found that animals could be given a dose of virus and, at the same time, a dose of serum sufficiently large to prevent the development of any evidence of infection, and that such animals were immune when tested (with suitable controls) with virus up to 140 days later.—[ED.]

less than six months previously. Serious and sometimes fatal symptoms have been observed when immunized, recovered, or hyperimmunized animals have been subjected to transfusion within a few weeks of recovery or immunization.

Van Saceghem finds that the simultaneous injection of virus and serum for active immunization is unsatisfactory, his view being that the serum neutralizes a part of the virus at once. He has devised a more satisfactory method in which 0·1 cc. of virus is injected, and after the disease has developed a dose of 50 cc. of serum is injected intravenously on the tenth day. It is his experience that the period of incubation depends upon the dose of virus given.

KELSER (R. A.). **Equine Infectious Anaemia.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Dec. Vol. 62. No. 3. pp. 319–327. With 8 text figs.

In this article the author describes an outbreak of infectious anaemia which occurred in the Remount Depot at Fort Robinson in November, 1921.

Although the colts were closely associated with the mares only one case occurred among the former, while 27 mares out of a total of about 100 were affected. Fifteen cases terminated fatally.

The symptoms presented were those ordinarily found in such cases. Persistent high temperature was recorded in the acute cases, while in the chronic cases irregular febrile attacks were recorded. Dullness, inappetence during fever, oedema of dependent parts, and "dirty pink" conjunctiva were the chief symptoms. Petechiae were observed on the mucous membranes in some cases, and slight serous discharges from the eyes and nose were seen in others.

In five chronic cases blood counts were made, and the figures ranged from $3\frac{1}{4}$ to $4\frac{1}{4}$ million. A scarcity of eosinophiles was an outstanding feature of the blood examination.

From the small number of examinations made it appears that albuminuria is possibly more constant in acute than in chronic cases.

At the post mortem examinations the following lesions were found: Marked emaciation, yellowish or blood-tinged fluid in the peritoneal cavity. Haemorrhages of various sizes on the serous membranes. The liver was always friable and sometimes pale in colour. The spleen was up to three times the normal size, and in some cases ruptured. The kidneys showed parenchymatous degeneration.

The yellow marrow of the medulla of the long bones showed dark red areas.

The mares were pastured at times on low boggy land, which was sometimes partly submerged. There was a history that the disease had been prevalent on neighbouring farms, and as some of the mares were purchased locally it appeared to be probable that the disease was imported into the Remount Depot by some of these.

No definite information was obtained regarding the natural method of transmission, but it is stated that the general conditions appeared to suggest that pasture infection was concerned rather than biting flies.

SCOTT (J. W.). **Swamp Fever in Wyoming. Economic Importance, General Characteristics and Control.**—*University of Wyoming, Agricultural Experiment Station. Bulletin No. 121.* 1919. June. pp. 91–140. With 6 text figs.

The object of this paper is to bring to the notice of owners a general idea of the condition known as swamp fever.

The difficulties attending the control of the disease are pointed out in that (1) the cause has not been detected, (2) there appears to be no immunity, (3) no successful method of treatment has been discovered, and (4) until recently little was known regarding the manner in which the disease is transmitted.

The general impression is that the disease, which appears to have been recognized about 25 years ago, is waning, but the continued existence of chronic cases, and apparently healthy virus carriers will render possible epidemics of the disease.

The disease has a seasonal distribution. It begins in June or July, waxes until October, and then wanes through November and December. Chronic cases improve through the winter, but have relapses with the return of warm weather. Successive attacks may cause progressive weakness and finally death. On the other hand, the attacks may become less and less severe until there is no recognizable ill-health. In such cases inoculation tests will show that the animal is a virus carrier. Defective nutrition and work are both factors which influence the severity of relapses.

The disease has been diagnosed at all levels between sea-level and 9,000 ft. It has also been observed that while it may appear year after year on a certain farm, an adjoining one may be quite free from it.

In general—as its American name indicates—the disease is seen mainly on low-lying marshy land, but there appears to be no doubt that it occurs on high, well-drained land as well. Rainfall appears to influence the occurrence of the disease. It is more severe during wet seasons than during dry ones. It appears to be agreed that the disease is not contagious in the ordinary sense of the term. Healthy and infected horses may be fed and watered out of common vessels without the disease being transmitted.

All ages and breeds appear to be equally susceptible to infection, but under natural conditions the disease appears to be selective. There is no evidence to show that the virus is air-borne, the disease spreads slowly, and an epidemic is almost invariably restricted to a certain limited area.

The disease has been transmitted under experimental conditions by ingestion, the food being mixed with infective blood or urine, but where success has been achieved large quantities of infective material have been found to be essential, and the disease produced has always been of a mild type. It therefore appears to be improbable that ingestion is the usual method of infection. Other points against the ingestion theory of infection are that horses avoid food contaminated with urine, the disease is more prevalent in wet seasons (when contaminations with urine would be reduced), sunlight destroys the virus in two hours.

No success has been obtained in experimental inoculations with extracts of faeces, saliva, and sweat.

The available evidence appears to incriminate some biting parasite as the transmitting agent of the disease.

Taking into consideration geographical distribution, habits of feeding, period of prevalence, etc., the facts appear to point to flies as the transmitting agents of the disease.

The virus is filterable and is present in the blood. It is destroyed at 58° C. in one hour, two hours' exposure to sunlight kills it, but it resists drying for long periods. Virulent blood has remained infective after 30 days' exposure to temperatures below the freezing point.

The symptoms are very inconstant, and it is practically impossible to give what may be called a description of a typical case. The course

of the disease is also very variable. The most frequently observed symptoms are irregularly intermittent fever and a varying degree of anaemia, which is associated with oedema of dependent parts.

In some cases the symptoms are so vague that experimental inoculation must be resorted to in order to establish a diagnosis.

In view of the difficulty of diagnosing the disease in some cases, and of the possible existence of "carriers," once the disease has been definitely detected, all contacts should have their temperatures taken regularly with a view to detecting chronic and obscure cases, in which elevations of temperature lasting for brief periods only are the sole discoverable evidence of infection. Such animals should be isolated for observation.

No specific curative agent has been discovered as yet, nor has it been found possible to prepare a prophylactic serum. The control of the disease should therefore rest upon isolation or destruction of all affected animals. If isolation is practised it must be effective in that there should be a sufficient distance between the healthy and diseased horses to obviate the possibility of biting flies passing from one group to the other, or darkened and screened stables should be used for the diseased animals. The isolation should be permanent, or failing that, it should be repeated annually during the infective season.

SCOTT (J. M.). **Insect Transmission of Swamp Fever or Infectious Anaemia of Horses.**—*University of Wyoming Agricultural Experiment Station. Bulletin No. 133.* 1922. June. pp. 57–137. With 6 plates.

As indicated by the title this paper deals with the transmission of swamp fever. The author discusses the various theories that have been put forward by other investigators, and deals at some length with his own experiments in insect transmission.

The bulletin elaborates a good deal of the information contained in that abstracted above, and the author concludes that the most important means of natural transmission is through the agency of flies, and particularly Tabanus and *Stomoxys calcitrans*.

An extensive bibliography is given.

HAMERTON (A. E.). **Rabies in Irak and its Treatment by Carbolised Vaccine.**—*Jl. Royal Army Med. Corps.* 1922. Dec. Vol. 39. No. 6. pp. 403–418.

In the course of the article the author emphasizes the point that while the detection of Negri bodies permits of a positive diagnosis, the apparent absence of them does not warrant a negative diagnosis. Two instances, one of rabies in the dog, and one in the horse, are given in support of this statement. In neither case were Negri bodies found, but in both cases inoculation tests yielded positive results.

As in the East the medical officer is often called upon to give an opinion as to whether a dog is affected with rabies or not, and as the clinical features of the disease in this species are best described in veterinary textbooks, the author quotes for his guidance the account given by HUTYRA and MAREK.

In connection with the laboratory diagnosis of the disease detailed instruction is given regarding the methods of removing the brain and preparing specimens for microscopic examination.

The author then describes in detail the technique of the preparation of antirabic vaccine, as carried out at Baghdad, where owing to isolation and other factors certain special methods were adopted. These do not lend themselves to abstraction, and should be read in the original by those interested.

Further, indications are given of the points requiring consideration when it is necessary to form an opinion as to whether a person has been subjected to a risk of rabies or not. An outline is given of the limitations of antirabic treatment, and of the methods of treatment. In connection with the latter it is noted that thorough cauterization of the wound, even within half an hour of the bite, is not certainly effective in preventing infection. After the lapse of three or four hours it is probably useless. Valuable hints on rabbit breeding in hot countries are given in an appendix.

REMLINGER (P.), LEGER (M.) & TEPPAZ. **Contribution a l'étude de la Rage au Sénégal.** [Rabies in Senegal.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 4–6.

It has previously been reported that the virus of rabies in Senegal, as in the Soudan, is not invariably fatal to rabbits inoculated subdurally. The proportion of resistant animals found in the two countries is 1 in 9 and 1 in 6 respectively. Further, while the fixed virus of the Pasteur Institute of Paris is invariably fatal to rabbits in 10–11 days, the same virus is very irregular in its effect when tested in Senegal, in that the interval between subdural inoculation and death may range from 17–55 days.

In Morocco the virus behaves exactly as in France. In view of the fact that the Institute of Biology at Dakar is within comparatively easy communication with the Pasteur Institute at Tangier, some comparative tests with the two viruses were carried out.

Inoculations were carried out at Dakar with fixed virus, and with street virus from Tangier, and at Tangier street virus from Senegal was used for experiments.

The results indicated that street virus from Dakar and Tangier are practically identical in their effects. Further, fixed virus from the Pasteur Institute behaves at Dakar as at Tangier. Street virus from Morocco is identical in its effects in Senegal as in Morocco.

There is one lacuna in our knowledge which it has not been found possible to fill.

Some medical men hold that in addition to recently imported European virus there exists a virus indigenous to Central Africa which is not transmissible from the dog to man by bites. Attempts have been made to obtain this type of virus—if it exists—but without success.

MANOUELIAN (Y.) & VIALA (J.). **Un Cas de rage chez une Lionne.** [A Case of Rabies in a Lioness.]—*Ann. Inst. Pasteur.* 1922. Dec. Vol. 36. No. 12. pp. 830–832. With 1 plate.

The case occurred in one out of four lionesses about eight months old imported from Abyssinia. The owner noticed on their arrival in Paris that one of the animals was unusual in its behaviour. It appeared depressed, and remained apart from the others. There was complete loss of appetite. The following day it was extremely restless and roared continuously, and it was noted that the tone of the voice was deeper.

Twenty-four hours later paralysis of the hindquarters appeared. This extended rapidly, and by the next day had involved the forelegs. Death took place on the third day.

Negri bodies were found in the hippocampus, and the lesions described by NELIS and VAN GEHUCHTEN were present in the plexiform ganglion. Perivascular infiltrations with mononuclear cells were detected in sections from the nervous system.

The virus produced typical rabies in rabbits and guinea-pigs 14 and 15 days after intraocular inoculation.

There was no indication as to how the lioness became infected.

PHISALIX (M.). **Hérisson et virus rabique.** [The Hedgehog and the Virus of Rabies.]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 779–784.

Experimental inoculations of hedgehogs with fixed virus have been carried out with a view to ascertaining whether there is any relationship between resistance to venoms and to the virus of rabies. The hedgehog was selected because of the remarkable immunity which it possesses against various venoms and bacterial toxins. Four animals were inoculated, and the course of the infection varied from animal to animal.

The first developed symptoms on the sixteenth day. There was paralysis of the hindquarters, marked tetaniform spasms, wasting, and death on the tenth day after inoculation.

In the second case symptoms made their appearance on the seventeenth day. Paralysis involving at first the hindquarters gradually spread forwards. There were spasms involving the pharynx lasting for several seconds. Towards the end of the first month after inoculation there was a complete remission of symptoms. A relapse occurred and death took place on the forty-eighth day after inoculation.

The disease in the third hedgehog was characterized by symptoms of localized paralysis affecting principally the genital system. There were no tetaniform spasms. There was a short remission of symptoms a month after inoculation, but a relapse occurred, and death took place 142 days after inoculation. The animal at the time of death weighed a little more than half its original weight.

The last animal showed slight fleeting symptoms of paralysis of the hind legs from the eighty-fourth day. These lasted for a very short time only, and the animal subsequently gained in weight and finally made a complete recovery.

None of the animals showed any tendency to attack other animals or persons handling them.

Attempts to infect rabbits with material from the brains of these hedgehogs have failed.

JANUSCHKE (E.). **Bacteriologische Befunde bei Eiterungen nach der Maul-und Klauenseucheimpfung mit sterilem Rekonvaleszentenblut.** [Bacteriological Findings in Abscesses following the Injection of Sterile Blood from Animals Recovered from Foot and Mouth Disease.]—*Arch. f. Wissensch. u. Prakt. Tierheilk.* 1922. Nov. 4. Vol. 48. No. 5–6. pp. 304–312.

Four out of 18 animals which were injected subcutaneously with sterile blood from recovered animals developed thick-walled abscesses at the seats of injection. The blood used had been stored for some

months, and it was tested bacteriologically and found to be sterile. The principal organism found in the pus was *Bacillus pyogenes*, but there were also present staphylococci, a slender filamentous organism, and two types of Gram-negative bacilli.

The suggestion is made that the *B. pyogenes* gained access to the animals' bodies through foot-and-mouth lesions in the mouth, and established itself in the injected blood.

FROSCH (P.). **Die Morphologie des Lungenseucheerregers.** [The Morphology of the Causal Organism of Pleuropneumonia.]—*Arch. f. Wissensch. u. Prakt. Tierheilk.* 1922. Dec. 30. Vol. 49. No. 1–3. pp. 35–43. With 10 text figs.

VERGE (J.). **Le Pronostic de la Rage chez l'homme et chez les animaux.** [The Prognosis of Rabies in Man and Animals.]—*Rev. Path. Comp. et d'Hyg. Gén.* 1923. Mar. 5. Vol. 23. No. 224.

MISCELLANEOUS.

BLACK (O. F.), EGGLESTON (W. W.), KELLY (J. W.) & TURNER (H. C.). **Poisonous Properties of** *Bikukulla cucullaria* **(Dutchman's Breeches) and** *B. canadensis* **(Squirrel Corn).**—*Jl. Agric. Res.* 1923. Jan. 13. Vol. 23. No. 2. pp. 69–78.

The authors' summary is as follows :—

"1. *Bikukulla cucullaria* and *B. canadensis*, in Virginia popularly called "little staggerweeds," have long been considered poisonous to cattle.

"2. Chemical examination has shown that both these plants contain toxic alkaloids, and that the tops as well as the bulbs of *B. cucullaria* are poisonous.

"3. *B. cucullaria* contains at least one alkaloid of a highly poisonous nature. The alkaloid, heretofore apparently unknown, has been named cucullarine, and its properties are described.

"4. Cucullarine probably occurs in *B. canadensis* also, since its physiological effect on mice closely resembles that of *B. cucullaria*.

"5. Feeding experiments show that *B. cucullaria* is toxic for cattle."

DODD (S.). **Poisoning of Sheep by** *Solanum cinereum*.—*Vet. Jl.* 1923. Feb. Vol. 79. No. 2. pp. 56–59.

The enquiry referred to in this paper was instituted as a result of the death of 45 sheep out of a lot of 1,100 in a particular paddock. In the paddock there was plenty of grass and a fair amount of the plant. It was not known what interval had elapsed between the eating of the berries and leaves and the commencement of the mortality, but sheep had been observed to eat them two or three weeks before any were found dead. A consignment of about 10 lb. of the dried mature plant was obtained for experiment. It was found that the dried up intact fruits were apparently harmless, but that when a mash of them was made with water toxic effects were obtained. The difference is explained on the grounds that the fruits eaten dry would be mixed up with the

contents of the rumen, but when the mash was given the alkaloids would be dissolved out and would pass direct to the abomasum.

Chemical investigations are not complete, but on clinical grounds the plant would appear to belong to the solanine group and not to the atropine or nicotine groups of the Solanaceae. If the fruits are eaten fresh and in quantities of at least 8 ounces the alkaloid passes to the abomasum and death occurs in a few hours. The principal symptoms are salivation, perspiration, intense congestion of the visible mucous membranes, disordered cardiac and respiratory actions, and diarrhoea.

Of the dried fruits large quantities must be consumed in order to produce symptoms.

In a footnote to this article it is stated that the paper was read before the Royal Society of New South Wales, September 6, 1922.

McMARTIN. **Kudzu. A Remarkable Fodder Plant—A Queensland Farmer's Observations.**—*Queensland Agric. Jl.* 1922. Nov. Vol. 18. No. 5. pp. 365–366.

Kudzu is an exceptionally rapid grower. In damp warm weather the runners of the vine have been observed to advance 8 to 9 in. in 24 hours. It resists dry weather for long periods. As it is deep-rooted, it outlasts the average grasses and shrubs during dry periods.

A few experiments in feeding have been carried out. During a very dry winter the kudzu area was fed down several times by sheep, and each time, in spite of the absence of rain, fresh shoots developed immediately the sheep were removed. The author's vines have given no evidence of seeding, propagation is by roots which strike from the nodes of the main runners. He does not see any reason to discredit the American claim that kudzu when grown on trellises 12 ft. apart will carry six milking cows to the acre.

Kudzu roots should be planted in damp soil and watered every few days for a fortnight.

TINLINE (M. J.). **Prevention of Goitre in Lambs.**—*The Dominion Experimental Farms (Canada). Seasonable Hints. Prairie Edition.* 1922. Nov. No. 24. pp. 4–5.

Goitre is causing serious losses among lambs in the Prairie Provinces, and the season of 1921 was a particularly bad one in this respect. It was attributed to feeding a ration of threshed oats and oat straw. With a view to determining whether this was the case or not, a flock of 89 ewes was divided into four batches in the autumn of 1921. One lot was fed on the same ration as during the previous winter as a control ; the second batch had the same diet, but it was fed at a distance from the shed to enforce exercise ; the third had the same ration, but in addition a 2 per cent. solution of potassium iodide ; and the fourth had a variety of feeds including hay, straw, silage, oats, bran, and oil cake. It is stated that half a pound of potassium iodide is sufficient for 22 ewes for a period of five months.

The results obtained in the " Iodide " group were the best. The lamb yield was 154 per cent., the average weight was 8·2 lb., and none showed goitre. The lamb yields in the other batches were the same or lower, the average weight ranged from 6·8–7·7 lb. and the incidence of goitre from 38 to 45 per cent.

The experiment is to be repeated.

WHEELER (G. A.), GOLDBERGER (J.) & BLACKSTOCK (M. R.). **On the Probable Identity of the Chittenden-Underhill Pellagralike Syndrome in Dogs, and "Black Tongue." With Report of Necropsy Findings in Two Cases of Blacktongue.**—*Public Health Reports.* 1922. May 5. Vol. 37. No. 18. pp. 1063–1069.

This paper does not contain any account of experimental work, but is a brief summary of the available literature (excluding Italian) on the disease generally known in this country as Stuttgart disease.

It is admitted that much work will have to be done before any definite connection between Stuttgart disease and pellagra is established, but in the opinion of the authors the resemblance between the naturally contracted disease of the dog and the condition produced experimentally in the same species by CHITTENDEN and UNDERHILL almost establishes their identity. The paper includes a full bibliography (excluding references in Italian literature which were not available).

BOSSE (R.). **Ekzem im Anschlusse an eine Neosalvarsaninfusion.** [Eczema as a Sequel to an Intravenous Injection of Neosalvarsan.] —*Berlin Tierärzt. Wochensch.* 1917. Aug. 9. Vol. 33. No. 33. p. 357.

The case was one of laminitis in a heavy artillery horse, and as the usual remedial measures effected very little improvement in the course of a fortnight an injection of 4·5 gm. of neosalvarsan in 100 cc. of boiled water was given intravenously. Within 24 hours eczema developed over an area of considerable extent between the site of injection into the left jugular vein and the shoulder. The skin was covered with a clear yellow exudate in the form of drops, and hair was beginning to fall out. The following morning there was a similar eczematous patch on the left flank. There was no evidence of irritation, and the general condition of the animal remained normal. The possibility of the case being one of mange was further negatived by the fact that the horse standing next to it failed to develop any lesions. The case is believed to be one of special susceptibility to the drug.

BODLAENDER (G.). **Über die Brauchbarkeit der Blutnährböden nach H. Langer für bakteriologische Zwecke.** [The Suitability of Langer's Blood Medium for Bacteriological Purposes.]—*Arch. f. Wissensch. u. Praktisch. Tierheilk.* 1922. Nov. 4. Vol. 48. No. 5–6. pp. 271–280.

The medium was devised as a substitute for meat or meat extract media when the latter were practically unobtainable.

Blot clot is broken up into small pieces ("it is best thoroughly kneaded by hand") and mixed with one and a half volumes of a solution containing 2 grammes of "Pankreon" (Rhenania), 1 gm. of sodium carbonate, and 5 cc. of chloroform in a litre of water. The mixture is incubated at 37° C. for 48 hours, and is then steamed and filtered. This gives a clear brown liquid, which after being rendered faintly alkaline may be used as broth or for the production of agar.

Bodlaender found that slight modifications might be introduced into the method of manufacture.

Sometimes after steaming a slight turbidity makes its appearance. This can be got rid of by acidulating with acetic acid, steaming, filtering, and again correcting the reaction.

Tubercle bacilli were found to grow on it when 2 per cent. glycerin was added. Growth was very sparing in primary cultures, and evidence of growth was only obtained after about three weeks. [It is not stated whether the cultures were themselves subcultures or primary growths from lesions.] A list is given showing the bacteria used in the tests of the medium and the results obtained. The indications are that the medium is not inferior to those prepared from meat or meat extracts.

MACARTHUR (W. P.). **The Elementary Principles of Zoological Nomenclature.**—*Jl. Royal Army Med. Corps.* 1922. Dec. Vol. 39. No. 6. pp. 441–449.

In this paper the author has, at the request of a number of officers, given a general outline of the system upon which zoological nomenclature is based, and it will no doubt be found very useful by those who are not familiar with the subject.

ALLEAUX (V.). **L'Elevage et les Maladies des animaux domestiques à Madagascar.** [The Breeding and Diseases of Domesticated Animals in Madagascar.]—*Rev. Gén. Méd. Vét.* 1922. Dec. 15. Vol. 31. No. 372. pp. 697–710. With 2 text figs.

GOLDBERG (S. A.) & MAYNARD (L. A.). **Studies of Cotton Seed Poisoning. I. The Pathological Tissue Changes resulting from Continuous Feeding of Cotton Seed Meal.**—*Jl. Amer. Vet. Med. Assoc.* 1923. Jan. Vol. 52. No. 4. pp. 450–457. With 6 text figs.

ROBINSON (E. M.). **Non-Specific Gall-Sickness of Cattle in South Africa.**—*Union of South Africa. Jl. Dept. Agric.* 1923. Feb. Vol. 6. No. 2. pp. 137–143.

REPORTS.

UNION OF SOUTH AFRICA. **Annual Report of the Department of Agriculture for the Year ended June 30th, 1922.**—Ex. *Journal of Dept. of Agric.* 1922. Dec. Vol. 5. No. 6.

Report No. II. Veterinary Division.—The principal veterinary officer emphasizes the necessity of appointing a sufficiently large field staff to ensure the proper observation of regulations. He points out that economy can be pushed too far, and that actual saving would promptly result from the employment of additional officers.

East Coast Fever.—In the Cape Province one outbreak was detected during the year and only one animal is known to have died. Within the quarantined area the dipping interval was shortened from 7 to 5 days.

In the Transvaal nine districts are infected against six at the end of the previous year.

In Natal the general position has improved, but outbreaks have occurred in previously clean areas. Inadequate supervision and familiarity with the disease led to slackening and even cessation of dipping in certain parts.

In the Transkei the position as shown by the number of outbreaks and the areas in quarantine is slightly worse than last year. Anthrax is very prevalent, and is responsible for greater losses than those due to all other contagious diseases. The practice of skinning and cutting up carcases of animals dying suddenly is largely responsible for the prevalence of the disease.

Dourine or Slapsiekte.—In the Cape 47 outbreaks, involving 1,155 animals, were dealt with, 102 of these died or were destroyed. In the Orange Free State the disease was discovered in the Boshof District and 39 animals were destroyed.

Report No. III. Veterinary Education and Research.—It is not possible to make satisfactory abstracts of the condensed accounts of research work published in a report of this kind, but the subjects referred to will no doubt receive full treatment elsewhere. Mention may, however, be made of the detection of Malta Fever in some goats.

TROPICAL DISEASES BUREAU.

TROPICAL VETERINARY BULLETIN.

VOL. 11.] August 30, 1923. [No. 3.

DISEASES DUE TO PROTOZOAN PARASITES.

DOBELL (Clifford). **The Discovery of the Coccidia.**—*Parasitology.* 1922. Dec. Vol. 14. No. 3/4. pp. 342–348.

Dobell has studied a number of hitherto unpublished letters of VAN LEEUWENHOEK and in one of them has found what he believes to be a record of the detection of coccidia in the bile of rabbits, and of the eggs of flukes in that of cattle.

Dobell has translated the passage in which the record occurs. The structures seen in the bile of old rabbits are described as oval corpuscles of a figure like those that he had seen in the bile of the ox. These he described as having the shape of an egg, save that one end was not more pointed than the other. He believed that they were filled with liquid. On lifting some of these bodies out on a hair, he observed that they became "bent in." [The ease with which fluke eggs are deformed by external conditions is well known.] The letters of VAN LEEUWENHOEK are preserved by the Royal Society, but two are apparently missing. The total number of letters not published by VAN LEEUWENHOEK would appear to be 27.

JAMOT (E.). **Un nouveau foyer de Trypanosomiase humaine au Tchad.** [A New Centre of Human Trypanosomiasis at Chad.]—*Bull. Soc. Path. Exot.* 1923. Feb. Vol. 16. No. 2. pp. 93–96.

The author has detected the existence of sleeping sickness in a number of villages previously thought to be free. The principal centre appears to be at Kabé. *G. palpalis* has not been found, but there appears to be an agreement between the distribution of the disease and the occurrence of *G. tachinoides.*

IWANOW (E.). **A Contribution to the Biology of** *Trypanosoma equiperdum.*—*Parasitology.* 1922. Dec. Vol. 14. No. 3/4. pp. 315–319.

The author was unable to find evidence that *T. equiperdum* is present in the semen of either mice (four) or a dog, even when the blood is swarming with trypanosomes. Microscopic examination and inoculations with semen were both made with a view to obtaining the evidence. Experiments in which blood containing *T. equiperdum* was introduced into the vagina of mice in such a way as to preclude any possibility of injuring the mucous membrane in every case failed

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to yield any evidence that the trypanosomes can penetrate intact mucous membrane. During coitus small abrasions are extremely likely to be produced, and these serve as ports of entry of the trypanosome.

It has been found that dourine is transmitted in 60 to 75 per cent. of cases when one of the animals taking part in the act is infected. The absence of infection in the remaining 25 to 40 per cent. of cases is explained by the absence of any abrasion of the mucous membranes.

VAN SACEGHEM (R.). **Trypanosomes des chauves-souris en Afrique.** [Trypanosomes of Bats in Africa.]—*Bull. Agric. Congo Belge.* 1922. Sept.–Dec. Vol. 13. No. 3/4. pp. 611–612.

The author records the occurrence of a trypanosome, which he identifies with *T. vespertilionis*, Battaglia.

VAN SACEGHEM (R.). **Les infections doubles à trypanosomes pathogènes.** [Double Infections with Pathogenic Trypanosomes.]—*Bull. Agric. Congo Belge.* 1922. Sept.–Dec. Vol. 13. No. 3/4. pp. 612–613.

The author has been able to infect animals harbouring *T. congolense* (*pecorum*) with *T. cazalboui* var. *vivax*, and vice versa. On these grounds he agrees with those who consider that Baleri is not a single disease caused by a dimorphic trypanosome, but a mixed infection.

VAN SACEGHEM (René). **Les trypanosomes pathogènes dans le liquide cephalo-rachidien.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1922. Dec. Vol. 2. No. 2/3. pp. 269–270.

The author has asked himself whether all the pathogenic trypanosomes are able to penetrate into the cerebrospinal fluid and concludes from certain observations made by him that this is not the case. He has examined the spinal fluid of a great number of cattle infected with *T. congolense* in all stages of the disease, but always with negative results. Neither has he been able to demonstrate any macroscopic lesions in the meninges of animals which have died of this infection. He explains the nervous symptoms, *e.g.*, paresis of the hind limbs, etc., as the result of toxins which act on the nerve centres.

NEUMANN (K.) & DAHMEN (H.). **Zur Diagnose der Beschälseuche. Hodenpunktion.** [The Diagnosis of Dourine. Puncture of the Testicles.]—*Berlin. Tierärzt. Woch.* 1922. Nov. 16. Vol. 38. No. 46. pp. 527–528.

After pointing out the difficulties of arriving at a definite diagnosis in cases of dourine, the authors give details of three animals in which puncture of the testicle was resorted to with the object of establishing a diagnosis. All three were stallions which had been under observation for about three months, and which had, at one time or another, reacted positively to the lipoid and complement fixation tests. The testicles were punctured with a fine bleeding-needle and the material obtained was examined fresh.

In two cases, in which there was swelling of the scrotum, trypanosomes were found with ease, but in the third animal, which only shewed facial paralysis, no trypanosomes were found.

The animals were all castrated and further preparations were made from the tunica vaginalis in each case. The results confirmed those obtained prior to castration. Although the scrotum in two of the animals was markedly enlarged, this was not due to enlargement of

the testicles themselves, but to thickening of the tunica vaginalis and to the presence of liquid in the sac.

Microscopic examination of sections revealed a round-celled infiltration of the matrix of the testicles. No trypanosomes were found, and this the authors believe was due to their concealment by the cellular elements. They were found in the tunica.

MAAG (A.). **Klinische Beobactungen über Beschälseuche in Südwestafrika, 1918–19.** [Clinical Observations on Dourine in South West Africa during 1918–19.]—*Berlin. Tierärzt. Woch.* 1921. Mar. 24. Vol. 37. No. 12. pp. 136–138.

The disease was first observed in 1914. During 1918–19 the author examined the animals in the neighbourhood of Windhuk systematically. He encountered 7 cases in males and 46 in females.

The symptoms were as follows: General depression and loss of condition. Occasionally there was an elevation of temperature, but actual fever was never observed. Sexual excitement was frequently noticed, but animals in this condition did not exhibit any desire for the opposite sex.

Abnormalities of the genital apparatus generally make their appearance early in the course of the disease, and, as they are sometimes fleeting, may escape observation. Paralysis of the penis was observed in two cases. The female genital organs shew abnormalities more frequently than those of the male. Relaxation of the lips of the vulva is common, associated in some cases with a muco-purulent discharge. Sterility and abortion have not come under the author's notice as frequent complications of dourine. One mare, which was known to have been infected for four years, had had three healthy foals.

The occurrence of plaques has been noted, and the author's experience agrees with that of others, that these are sometimes visible for a short time only. Paralysis, beginning in the hind quarters, is one of the most important features of the later stages of the disease.

Recovery has been observed in a few cases in which paralysis had actually set in. It is not known whether in such cases the recovery is complete or whether the animals remain infected.

VAN SACEGHEM (R.). **L'intrapalpebro-réaction dans le diagnostic des trypanosomiases.** [The Intrapalpebral Test in the Diagnosis of Trypanosomiasis.]—*Bull. Agric. Congo Belge.* 1922. Sept.–Dec. Vol. 13. No. 3–4. pp. 613–615.

This note appeared elsewhere and has already been abstracted [see this *Bulletin* Vol. 11, May, 1923, p. 44].

BALOZET (L.), LAVIER (G.), & VELU (H.). **Traitement d'un cheval douriné par le "Bayer 205."** [Treatment of a Case of Dourine with "Bayer 205."]—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Apr. Vol. 1. No. 1. p. 70.

The horse treated was incapable of trotting, owing to paresis of the hind quarters, and shewed paralysis of the penis associated with circular depigmented areas on its extremity and on the sheath.

The case was first treated with atoxyl given intravenously. The first dose was 3 gm., and on alternate days afterwards 5 gm. were given until six injections, totalling 28 gm., had been administered.

The paralysis remained practically unaltered.

About a fortnight after treatment with atoxyl ceased, Bayer 205 was given. On the first day 1 gm. was given intravenously in 10 per cent. solution. On the second and fourth days 4 and 2 gm. were given respectively. Improvements took place, and after a week paralysis had entirely disappeared.

Seven weeks later the horse was used for severe military work and no abnormality was noted.

LAVIER (G.) & VELU (H.). **Traitement des trypanosomoses à *T. marocanum* par le " Bayer 205."** [Treatment of *T. marocanum* Infections by " Bayer 205."]—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Apr. Vol. 1. No. 1. pp. 71–72.

This short paper contains the records of eight dogs inoculated with *T. marocanum*, the strain used having been obtained from Casablanca, and treated with " Bayer 205." Four dogs were left untreated as controls. These died in 46, 57, 57 and 101 days.

The first case treated was given 20 cgm. and 30 cgm. subcutaneously with one day's interval. Death occurred.

In subsequent experiments the dose was increased to 40 cgm. or 50 cgm., and was administered intravenously. Of the seven animals treated in this way, only one died.

HERZOG (L.) & LAVIER (G.). **Traitement d'un cas de Debab du Dromedaire par le " Bayer 205."** [Treatment of a Case of Debab in a Dromedary with " Bayer 205."]—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Apr. Vol. 1. No. 1. pp. 73–74.

A dromedary in a condition of extreme emaciation was found to have large numbers of trypanosomes in its blood. Four dogs inoculated from it died in 58 to 65 days. Four grammes of " Bayer 205 " were given intravenously in 10 per cent. solution. Trypanosomes were not discoverable in the blood on the following day. The animal improved greatly in condition and six months later was apparently quite healthy.

A dog inoculated from one of the first four showed irregular fever and double keratitis after about six weeks. An intravenous injection of 50 cgm. of " Bayer 205 " was given. Forty-eight hours later trypanosomes had disappeared from the blood and in the course of a week the temperature became normal and the keratitis disappeared. The authors draw special attention to the fact that only a single dose of the drug was used and emphasize the importance of this in a country where animals cannot be kept under observation. They state that an additional advantage of using " 205 " is that it can be given subcutaneously without risk and without any special technique, but they cite no cases in support of this statement.

VAN SACEGHEM (René). **Note sur le traitement des trypanosomes animales par l'émétique.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1922. Dec. Vol. 2. No. 2/3. pp. 135–136.

Three oxen transfused with heavily infected blood (*T. congolense*) from other oxen were immediately afterwards treated with 0·5 gm. or 1 gm. of tartar emetic, intramuscularly or intravenously. Trypanosomes were found in the blood of all of them within 10 days. The conclusion is that within a few minutes of the transfusion the trypanosomes had succeeded in gaining shelter from the action of the emetic.

VAN SACEGHEM (R.). **La Sérothérapie dans le traitement des trypanosomiases.** [Serum Therapy in the Treatment of Trypanosomiasis.] —*Bull. Agric. Congo Belge.* 1922. Sept.–Dec. Vol. 13. No. 3/4. pp. 615–619.

The author has repeated the experiments previously reported (see this *Bulletin*, Vol. 11, No. 2, May, 1923, pp. 44–45) with sheep infected with *T. gambiense*, and has obtained similar results.

OUZILLEAU & LEFROU. **Le traitement de la maladie du sommeil par l'Atoxyl. Sa réglementation.** [The Treatment of Sleeping Sickness by Atoxyl.]—*Ann. Inst. Pasteur.* 1923. Mar. Vol. 37. No. 3. pp. 275–293.

Atoxyl is the drug most currently used for the treatment of sleeping sickness, but there is great divergence of opinion as to the best manner of administration; whether small doses frequently repeated, larger doses at longer intervals, or other plans give the best results.

In this paper the authors make a survey of the records of the Pasteur Institute at Brazzaville.

The results appear to indicate quite clearly that large doses give the highest percentage of cures. In the first stage of the diseases doses of less than 0·015 g. per kilogramme should not be used.

Six injections should be given at intervals of a fortnight. Four of these should be at the rate of 0·015 g. per kilogramme and 2 at 0·02. Six months after the first series of doses, a second should be given, and the same quantities should be administered.

Atoxyl has been blamed for causing a number of ill-effects, but these are avoided by careful observation of the patient, by accurate weighing in order to gauge the doses, and by extreme care in measuring and administering them.

LEFROU. **Essais de traitement de la maladie du sommeil à la deuxième période. Les principes directeurs—résultats de leur application.** [The Treatment of Sleeping Sickness during the Second Phase of the Disease.]—*Ann. Inst. Pasteur.* 1923. Mar. Vol. 37. No. 3. pp. 294–321.

The author is of opinion that there remains yet to be found a treatment that will yield successful results in the treatment of sleeping sickness when the second phase (nervous disorders) has been reached.

LOW (G. C.) & MANSON-BAHR (P.). **The Treatment of Human Trypanosomiasis by "Bayer 205."**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. Jan. 18. Vol. 16. No. 7. pp. 339–383.

It is impracticable to summarize this valuable paper briefly, and, therefore, the following is taken from the conclusions drawn by the authors.

Nine cases of trypanosomiasis in Europeans have been treated, and of these seven have recovered.

By intravenous injection, 1–2 gm. in 10 or 20 per cent. solution are tolerated, but repeated injections are necessary. In most cases a course amounting to 10 gm. was sufficient. In exceptional cases the injections must be extended on account of reappearance of trypanosomes. The drug is retained in the body for some time and its action on the trypanosomes when in intimate association with serum is a delayed one.

The first three doses should be given at close intervals and subsequently doses of 1 gm. should be given once a week until 10 gm. have been given.

The effect of the drug upon the renal epithelium requires watching, the significance of albuminuria with casts is not properly understood, but apparently it should not be regarded as absolutely contra-indicating further use of the drug.

WENYON (C. M.). **Note on the Trypanosomocidal Action of the Serum and Cerebrospinal Fluid of Cases of Human Trypanosomiasis treated with "205," and on a Strain of** *Trypanosoma rhodesiense.*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. Jan. 18. Vol. 16. No. 7. pp. 389–390.

In one case 0·25 cc. of serum or cerebrospinal fluid taken from a case one week after an intravenous injection of "205" cleared the blood of mice infected with *T. equiperdum*, but trypanosomes reappeared and the mice died. Active cerebrospinal fluid and serum kept on ice for 10 days became inactive.

In another case serum and cerebrospinal fluid taken one week after an intravenous injection of 1 gm. of "205" were quite inactive. In this particular case the drug exerted no curative effect on the patient.

THOMSON (J. G.) & ROBERTSON (A.). **The Action of the Urine of a Human Patient treated with "Bayer 205" on an Infection of** *Trypanosoma rhodesiense* **in an Experimental Animal.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. Jan. 18. Vol. 16. No. 7. pp. 391–393.

A rat was inoculated with a laboratory strain of *T. rhodesiense*, which generally proved fatal in 9–10 days. On the sixth day the rat was given 0·5 cc. of urine, from a patient who had received seven injections of 2 gm. each, subcutaneously. Trypanosomes could not be found in the blood for two days. A second dose of 0·5 cc. of urine failed to cause trypanosomes to disappear. A dose of 0·75 cc. caused trypanosomes to disappear for eight days. Two doses of 1 cc. caused the trypanosomes to disappear again for five days. A further dose of 1 cc. taken 28 days after the patient had received the final dose of "205." Trypanosomes disappeared for one day only.

Later, a dose of 1·5 cc. was given, but owing to the injection being intraperitoneal instead of subcutaneous death of the rat occurred from shock. The rat had lived 40 days.

CHESTERMAN (Clement C.). **Tryparsamide in Sleeping Sickness. A Study of Forty Cases, with Special Reference to the Cerebrospinal Fluid.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. Jan. 18. Vol. 16. No. 7. pp. 394–408.

The author's general conclusions are as follows :—

"These are based on the intravenous administration of tryparsamide, although there is good reason to believe that the intramuscular route is not less efficacious.

"(1) The maximum tolerated dose (which should not exceed 4 grammes per week for the full-sized adult), if given regularly for a period of about eight weeks is capable of completely removing trypanosomes from, and rendering within the normal, the cell content of the cerebrospinal fluid of even the most advanced cases.

"(2) This change in the cerebrospinal fluid is accompanied *pari passu* by a very marked clinical improvement, which has so far been observed

to have been fully maintained for periods not exceeding eleven months, the longest time which has elapsed up to date since treatment.

" (3) It is possible to estimate the maximum tolerated weekly dose from a consideration of the clinical condition and cell content of the cerebrospinal fluid of the patient, so that these results can be obtained without danger of producing any appreciable degree of visual disturbance.

" (4) Improvement is hardly less marked in cases which have previously resisted treatment by other arsenical drugs.

" (5) The intravenous method of administration is superior to that of intrathecal serum therapy.

Chemotherapeutical Considerations.

" I am not acquainted with any literature on this subject and am indebted to Dr. NIERENSTEIN for his kindness in pointing out the probable explanation of the action of tryparsamide.

" Tryparsamide differs from atoxyl, firstly, in the fact that the arsenic is held in pentavalent combination instead of in the less stable trivalent form, and, secondly, that it contains the glycine group.

" MOORE, NIERENSTEIN and TODD came to the conclusion that the free NH_2 group was the active trypanocidal radicle in atoxyl and allied compounds, and they called it ' trypanophobe ' group.

" Now the lack of a free NH_2 group in tryparsamide probably accounts for its lessened toxicity, but as it may be hydrolysed in the organism, this group is set free and exerts its toxic action by combining with the protoplasm of the parasites.

" A second consideration is suggested by the fact that tryparsamide contains the glycine group, $NH.CH_2 CO$. Now this glycine group was found by WENDELSTADT to be a constituent of the only drug which was capable of exerting any action on *T. lewisi* in rats."

DONATIEN (A.) & LESTOQUARD (F.). **Le Debab naturel du chien. Transmission par les Stomoxes.** [Natural Debab in the Dog. Transmission by Stomoxys.]—*Bull. Soc. Path. Exot.* 1923. Mar. Vol. 16. No. 3. pp. 168–170.

Cases of trypanosomiasis occurred naturally among a litter of puppies, which were in the habit of frequenting the stables where dromedaries affected with debab were kept, and there appeared to be no doubt that the transmitting agents of the infection were stomoxys. Distinct symptoms were not presented until the later stages. Dullness and in one case marked somnolence were observed. The superficial glands were enlarged and painless. Unilateral keratitis was noticed.

At the postmortem lesions indicating anaemia were found. The spleen was enlarged and its pulp firm. The malpighian bodies were clearly visible. The lymphatic glands were enlarged and moist, bone marrow red and diffluent, liver enlarged, and the kidneys pale.

Microscopic examination of the cornea showed proliferation of vessels, and a cellular infiltration. Trypanosomes were found in large numbers in the blood, and it was especially noted that they retained their mobility particularly well in the liver, where they could be found still moving twelve hours after death. They became altered far more rapidly in the spleen and bone marrow.

VAN SACEGHEM (R.). **Mecanisme de la propagation des trypanosomiases par les stomoxes.** [The Mechanism of the Spread of Trypanosomiasis through the Medium of Stomoxys.]—*Bull. Agric. Congo Belge.* 1922. Sept.–Dec. Vol. 13. No. 3–4. pp. 606–609.

Van Saceghem finds that stomoxys flies do not act, as they have been credited with doing, simply as a hypodermic needle in conveying trypanosomes from animal to animal. He finds that if a stomoxys

which has engorged on an infected animal be examined trypanosomes and unaltered corpuscles are present in the stomach, but no parasites, and only deformed corpuscles in the proboscis. This is held to show that the saliva is destructive to the trypanosomes, those that are present in the stomach have escaped the action of the saliva by passing through to the stomach rapidly. Some may remain in the pharynx and buccal cavity. The rapid passage of the blood through the proboscis is effected by a pumping action of the pharynx.

It is only when a fly does not get a full meal on one animal that it goes to another to complete it, and it is in this way that trypanosomiasis is propagated. The infecting trypanosomes are not present in the proboscis, but are pumped out of the pharynx and possibly the buccal cavity when the fly attacks a new host. Transmission by stomoxys only occurs when animals are close together, and the spread of the infection is slow. In the absence of glossina trypanosomiasis can only be introduced into a healthy area by an infected animal, and, when outbreaks occur the healthy herds can be protected by keeping them at a distance from infected ones.

CROSS (H. E.). **A Further Note on Surra Transmission Experiments with** *Tabanus albimedius* **and Ticks.**—*Punjab Dept. Agric. Vet. Bull.* 1923. Jan. 31. No. 12.

Experiments with *Tabanus albimedius*. Two series were carried out. In the first the feeding of the flies was interrupted for the purpose of transferring them to another host, and two groups of tests were included in this series. In the first group the animals providing the first part of the meal had trypanosomes present in the circulation, and in the second trypanosomes were not discoverable in the circulation. In the first group the positive results were obtained in 15 experiments and in the second group 3 out of 17. In the second series the flies completed their meal on the surra infected animals and were then placed after intervals ranging from 1–4 days on clean animals. No positive results were obtained in 11 experiments.

[Further experiments appear to be desirable in which the interval between the two feeds should be longer.]

Experiments of a similar design were carried out with *Ornithodorus crossii*, Brumpt. Seven experiments in which the feed was interrupted yielded negative results. In the second series the ticks were allowed to complete their meal and were then kept for periods ranging from 15 days to 8 months 24 days before being fed on healthy animals. These experiments were divided into two groups: one in which trypanosomes were present in the circulation at the time of the feeding and the other in which trypanosomes were not discoverable in the circulating blood.

Of 20 experiments in the first group, two yielded positive results. The intervals between the feeds were 1 month and 17 days respectively. Of 12 experiments in the second group, one yielded a positive result. The interval between the feeds was one month.

DSCHUNKOWSKY (E.) & URODSCHEVITCH (J.). **The Spirochaetosis of Fowls in Macedonia. (Sp.** *anserina*, **sp.** *gallinarum*, **sp.** *granulosa penetrans.*)—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. Feb. Vol. 16. No. 8. pp. 478–485. [With Note by BALFOUR (A.).] With 2 plates comprising 9 figs.

Spirochaetosis and fowl cholera are causes of severe losses in Macedonia. Owners appear to be quite ignorant of the existence of argas,

as the roosting places are built high up in trees, to protect the birds from foxes, and are never cleaned out. They form admirable places for the congregation of argas.

The occurrence of "granules" in the red corpuscles of infected birds is recorded. These appear to be identical with those described by BALFOUR.

In the note added by BALFOUR, he draws attention to his abandonment of the term "afterphase bodies" for these granules, as they have been observed in the blood prior to the appearance of spirochaetes. Their exact nature and significance is not yet known, but the suggestion is put forward that they may represent a part of the cycle of Rickettsia occurring *pari passu* with spirochaetosis.

GAMBIER (A.). **Essai de transmission aux animaux de laboratoire du Spirochète de la fièvre récurrente soudanaise.** [The Transmission of the Spirochaete of Soudanese Relapsing Fever to Animals.]—*Bull. Soc. Path. Exot.* 1923. Mar. Vol. 16. No. 3. pp. 159–161.

In the monkey the spirochaete produces a mild infection without relapses. Immunity lasting for several months is conferred. It is difficult to infect white mice. Guinea-pigs and rabbits are refractory.

While proof is not forthcoming, the author is of opinion that the louse plays a part in the transmission of the disease. *Ornithodorus moubata* has never been found.

DE MELLO (F.) & REBELLO (F.). **Anaplasmose du *Bos brachycerus* d'Angola.** [Anaplasmosis of *Bos brachycerus* in Angola.]—*Bull. Soc. Path. Exot.* 1923. Mar. Vol. 16. No. 3. pp. 167–168.

The authors describe certain bodies which they have found in the blood of *Bos brachycerus*, but state that their observations are not sufficiently numerous to permit them to deny or affirm the parasitic nature of the bodies found.

On an average one or two could be found in each field and intra- and extra-corpuscular forms could be detected.

Nine different types are described, as follows:—(1) Coccus-like bodies ranging from 0·5–0·75 μ in diameter, staining an intense purple, and homogeneous in structure; (2) similar forms in pairs; (3) cocco-bacillary forms, single or in pairs, showing bi-polar staining; (4) oval forms measuring 1–1·5 μ in diameter, staining purple, with a more intensely stained speck in the centre; (5) forms similar to the preceding, but more resembling dumb-bells; (6) ring forms showing one half staining deep violet; (7) similar to No. 6, but showing two or more granules at the periphery; (8) similar forms, but with central granules separate from or connected with the ring by more or less radiating strands; (9) rounded bodies formed by two more or less clearly connected crescents.

BIZARD (E.) & TERRIEN (E.). **Cas de leishmaniose interne chez une adulte, contracté en France.**—[A Case of Internal Leishmaniasis contracted in France.]—*Bull. Soc. Path. Exot.* 1923. Feb. 14. Vol. 16. No. 2. pp. 89–91.

The diagnosis was established by the discovery of the parasite in a smear of blood. The patient was 32 years of age and had lived in Brittany up to July, 1920. Subsequent to that date she had lived in Nice and at Draguignan.

NICOLLE (C.) & ANDERSON (C.). **Conservation du virus de la leishmaniose canine sur les chiens dans les laboratoires.** [The Maintenance of Canine Leishmaniasis in Dogs in Laboratories.]—*Bull. Soc. Path. Exot.* 1922. Mar. Vol. 16. No. 3. pp. 171–173.

As a result of further experience with canine leishmaniasis, the authors have come to the conclusion that the failure to transmit the infection from dog to dog in the past has been due to the use of insufficiently large doses.

They have now been able to keep a strain for 26 months by six passages. In order to ensure the passage of the virus, severe cases must be selected as the starting point. The material should be collected as soon after the death of the dog as possible, although they have succeeded in one case in which putrefaction had already set in. Bone marrow is the material most likely to give positive results. Spleen pulp should be used only when infection in that organ is very severe. The whole of the marrow should be removed from the large bones and mixed with 20–40 cc. of sterile salt solution according to the size of the dog, and a dose of 6–8 cc. used for intraperitoneal inoculation. Inoculation with bone marrow is not always unattended by risk, a mortality of about 25 per cent. of dogs inoculated may result, and the others may present alarming symptoms. The remedy for this is the daily subcutaneous injection of 50 cc. of salt solution. The symptoms (which are not described) disappear in the course of three or four days. It is precisely this toxicity which the authors believe to be responsible for the success of inoculations. It is to be remembered that experimental leishmaniasis in the dog is a benign infection, recovery taking place within a few months. This renders prolonged investigation difficult.

Canine piroplasmosis frequently vitiated the experiments at one time, but by taking steps to keep the dogs free from ticks this difficulty has been overcome. These precautions are put in force from April to November. All dogs are washed with soap daily and clipped twice a month. The kennels are washed with cresyl once a week.

VELU (A.). **Contribution à l'étude des maladies à parasites endoglobulaires du bétail Marocain.** [The Intra-corpuscular Parasites of Cattle in Morocco.]—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Apr. Vol. 1. No. 1. pp. 54–64. With 6 text figs.

The author describes in detail the results obtained in the inoculation of eight Moroccan cattle, ranging from 3 to 15 months old. Three of the animals were born at the Laboratory, and were quite free from ticks. The remainder were purchased.

The original infective blood was obtained from a native cow and 95 per cent. of the corpuscles were invaded. Three animals were used in the first passage. One of these showed plasma bodies in small numbers in the glands. The other two showed none. Two calves were inoculated with blood from the calf which had shown plasma bodies. Both became infected and their glands showed reactions, but no plasma bodies were found.

Two calves (Nos. 6 and 7) were inoculated with blood from a native cow when 90 per cent. of the corpuscles showed parasites. Both reacted and plasma bodies were found in the glands. Both died. In the description of these experiments there appears to be a misprint regarding the inoculation of calf 7, it being stated that it was inoculated

with the same blood as calf 2, which has already been referred to in the previous batch of inoculations, as having received blood invaded to the extent of 95 per cent. of corpuscles. [From the context and from the table given it appears that calf 6 is meant instead of calf 2.] The disease produced is said to be peracute, acute and chronic in its manifestations. In the peracute form oedema of the eyelids, lachrymation, salivation, enlargements of the glands, nervous symptoms, fever, arrest of rumination, diarrhoea, jaundice, and sometimes haemoglobinuria.

The acute form is probably often not recognised. There is a marked rise of temperature, which may last for several days, without any other clinical evidence of infection. All the natural functions of the body are carried on normally. There may be enlargement of the superficial glands and slight oedema of the eyelids. Plasma bodies are absent from or only scantily present in preparations from the glands. The acute form may become chronic and terminate in death or recovery.

The usual form of the disease is the chronic one, which may last for months. There may be no fever and parasites may not be discoverable in the blood. When such cases terminate fatally progressive anaemia and diarrhoea are the only symptoms, save for great debility.

Diagnosis: Acute forms may pass unnoticed unless temperatures are taken regularly, when fever lasting for one or two days may be detected. In such cases slight swelling of superficial glands may also be noted. Parasites are scantily present in the blood.

Chronic forms of the disease require daily examinations of the blood and daily records of the temperature for their detection. Inoculation of experimental animals fails unless plasma bodies are present in the circulating blood.

The disease closely resembles Egyptian fever, described by MASON.

BRUMPT (E.). **Les theilerioses mortelles du bassin méditerranéen sont dues à** *Theileria mutans.* [The Fatal Theileriases of the Mediterranean Littoral are due to *Theileria mutans.*]—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Apr. Vol. 1. No. 1. pp. 16–53. With 2 plates and 3 text figs.

The author summarizes the views which have been held regarding the identity or otherwise of the bacilliform and ring-shaped intracorpuscular parasites which are responsible for fatal diseases in bovines in the countries bordering on the Mediterranean.

The author's own investigations have been carried out with two objects in view. In the first place the morphology and the biology of the parasites were studied from what may be termed the scientific standpoint, but the protective inoculation of pure bred French cattle for export purposes formed the practical aim of the investigations.

He states that he has been quite successful in protecting cattle against *P. bigeminum, P. argentinum,* and the anaplasms, but that success has not been achieved against *T. mutans.* Adverse circumstances, such as heat, other diseases and so on, have led to relapses, which have sometimes proved fatal in animals which have been immunized against *T. mutans.*

The author gives details of a number of experiments carried out with certain strains of virus.

In the blood of one bull in the second passage a typical reaction to *T. mutans* occurred after inoculation and the animal recovered. It also gave reactions to *P. bigeminum, P. argentinum* and anaplasma.

On the 117th day a relapse due to *T. mutans* occurred and the blood was found to be teeming with parasites, and in addition plasma bodies were found to be present in the large mononuclears in the peripheral blood. The animal died within 48 hours.

In a tabular statement he compares and contrasts certain morphological and biological features of *T. mutans* and *T. parva.*

	Theileria mutans.	*Theileria parva.*
Corpuscles invaded ..	80 to 95 per cent. in both calves and adults.	60 to 80, and rarely 95 per cent. in adults; far fewer in calves.
Number of parasites per corpuscle.	1 to 11, usually 3 to 5.	1 to 11, usually 1 to 3.
Ovoid and ring forms..	70 to 80 per cent.	20 to 75 per cent.; ring forms always scanty.
Bacillary and comma forms.	20 to 30 per cent.	25 to 80 per cent.
Cross forms	Very scanty or absent in acute cases.	Always fairly abundant.
Dimensions	2·8 to 3 μ (Gonder).	2·5 to 2·7 μ (Gonder).
Chromatin	Less abundant.	More abundant.
Movement	More active (Gonder).	Less active (Gonder).
Changes in invaded corpuscles.	None.	None.
Anaemia	Blood pale, serum icteric.	None.
Physiological races ..	Existence possible.	Super-infection does not occur.
Persistence of infection	Throughout life.	Complete recovery.
Seasonal occurrence ..	Parasites more numerous in summer than in winter.	Seasonal relapses do not occur as a recovered animal does not harbour the parasite.
Reproduction by binary division.	Occurs.	Occurs.
Quaternary division ..	Occurs.	Occurs.
Schizogony	Produces plasma bodies.	Produces plasma bodies.
Gametogony	Produces plasma bodies.	Produces plasma bodies.
Plasma bodies	Large, spherical or ovoid nuclei generally ovoid or elongated during the early stages.	Smaller, spherical, nuclei usually rounded in the early stages.
	Frequently present in the blood.	Apparently rare.
	Persist in the body throughout life.	Disappear within a few days of recovery.
Nature of the disease ..	Insidious and chronic.	Acute and constant in character.
Distribution	All the hot countries of the old world.	East and South Africa and the Soudan (?).
Mortality	Adults: 5–10 per cent.	Adults: 95–100 per cent.
	Young animals: Very low.	Young animals: 25 to 75 per cent.
Appearance of parasites in the blood.	Rapid after the rise of temperature.	Gradual from the 5th or 6th day of fever up to the time of death.
Relapses	Occur under various circumstances.	Have never been recorded.
Experimental infection	Small doses of blood, and very small quantities of plasma bodies are infective.	Blood not infective. Large doses of plasma bodies produce the infection.

The discovery of plasma bodies in a *T. mutans* infection renders the differential diagnosis of the two conditions more difficult.

In view of this discovery further investigations will have to be carried out in East and South Africa, where plasma bodies have been considered as pathognomonic of *T. parva*. On the other hand, in Transcaucasia, China, Eritrea and on the Mediterranean littoral generally the discovery of plasma bodies has been held to denote the existence of African coast fever. Interest will attach to attempts to produce a *T. mutans* infection in an animal recovered from *T. parva*. The author is of the opinion that the genus *Gonderia* should be deleted, and further that the name *T. annulatum* (Dschunkowsky and Luhs, 1904) was applied to mixed infections. The paper has a good bibliography.

ADLER (S.). **Malaria in Chimpanzees in Sierra Leone.**—*Ann. Trop. Med. & Parasit.* 1923. Apr. 18. Vol. 17. No. 1. pp. 13–18. With 2 plates.

Two out of 13 chimpanzees examined in Sierra Leone were found to harbour malaria parasites indistinguishable from *P. falciparum*. Both the animals were young. Older animals were found to be negative. Blood containing only crescents failed to infect another chimpanzee. There is as yet no evidence proving the identity of the parasite nor information as to its transmissibility to man.

FRANCHINI (G.). **Hématozoaires de quelques oiseaux d'Italie.** [Haematozoa of some Italian Birds.]—*Bull. Soc. Path. Exot.* 1923. Feb. Vol. 16. No. 2. pp. 118–125. With 2 text figs.

Two hundred and six birds belonging to eleven species have been examined and parasites have been found in 44 cases. These include haemoproteus 21, leucocytozoon 1, trypanosomes 5, haemogregarine 1, leishmaniform parasites 1, and microfilariae 15. Swallows and swifts accounted for 180 of the birds.

Descriptions are given of the haemoproteus, leucocytozoon and microfilariae.

FRANCHINI (G.). **Essais d'inoculation de latex parasités aux souris blanches. Abcès du foie expérimentaux detérminés par les amibes des latex.** [The Inoculation of White Mice with Latex containing Parasites, and the Production of Liver Abscess.]—*Bull. Soc. Path. Exot.* 1923. Mar. Vol. 16. No. 3. pp. 162–166. With 1 text fig.

The author gives details of experiments in which attempts were made to infect a number of mice by ingestion or inoculation. Nine were subjected to experiments and in two cases abscess of the liver was produced. In the other seven cases parasites were found in smears from various organs.

The parasites were amoebiform and showed blood corpuscles within their cytoplasm.

GHOSH (E.). **On a New Ciliate,** *Balantidium ovatum,* **sp.nov., an Intestinal Parasite in the Common Cockroach** (*Blatta americana*). —*Parasitology*. 1922. Dec. Vol. 14. No. 3/4. p. 371. With 1 text fig.

The description given is from a single specimen which was found in the intestinal contents. It measured 85 μ in length. This is the second example of Balantidium found in the cockroach. It is said to differ from all known species in the presence of an anal canal in connection with the contractile vacuole.

DISEASES DUE TO METAZOAN PARASITES.

BAYLIS (H. A.). **Notes on the Collection and Preservation of Parasitic Worms.**—*Parasitology*. 1922. Dec. Vol. 14. No. 3/4. pp. 402–408.

This paper aims at supplying details of technique for the purposes shown in the title, which can be applied in the field or in a field laboratory.

In connection with " collecting " emphasis is laid upon the necessity of searching organs other than the alimentary canal. The mucous lining of the latter is to be searched for encysted parasites. Small worms may be collected from the contents by stirring these in water in a tall jar and after allowing a few minutes for the worms to settle decanting the fluid. The necessity of caution in removing cestodes from the mucous membrane is stressed, as it is extremely likely that the " head " will remain embedded in the membrane.

Encapsuled or encysted nematodes are removed more easily from fresh than from fixed tissues. Sometimes, if the enclosing tissue be cut and placed in salt solution, the worms will emerge of their own accord.

For washing parasites 1 per cent. salt solution may be used. Species which have a mouth capsule which may contain epithelium or other material may be shaken fairly vigorously in salt solution without damage. For cestodes, unless the cuticle is required to be in perfect condition, lukewarm water may be used. Washing should not be prolonged. If it is required to keep worms alive they should be kept in their natural elements and not placed in water or salt.

Methods of fixing are not applicable to all groups indiscriminately. The resistant cuticle of nematodes renders cold fixatives unsuitable. For these the best is Looss' hot 70 per cent. alcohol. The liquid should be heated till it steams, but does not boil. BOULENGER recommends 70° C. After fixing, the worms are preserved in 70 per cent. alcohol.

In the case of small specimens it is sometimes an advantage to use a 5 per cent. solution of pure glycerine in 70 per cent. alcohol. The procedure is the same.

Formalin should be avoided, and Baylis is of the opinion that even if heating is to be avoided 70 per cent. alcohol is preferable to formalin.

WARD recommends a mixture of equal parts of acetic acid, absolute alcohol, saturated watery corrosive sublimate containing 0·25 per cent. osmic acid. Acanthocephala should be fixed with the proboscis protruded. This may be achieved by pressing the worms gently

between slides and fixing while the pressure is maintained. Cold or hot 70 per cent. alcohol may be used.

For trematodes the following method is recommended. The worms are twice washed with shaking in salt solution. After the second shaking an equal volume of saturated corrosive sublimate (in water?) with a few drops of acetic acid is added. The shaking is then continued for a few minutes. This cleans the specimens and prevents muscular contraction. The worms may be left in the sublimate for a few days, or transferred to water after a few minutes. They are then washed in running water for 12–24 hours or transferred to 70 per cent. alcohol tinted with iodine to the colour of sherry. This should be changed until the colour of the iodine ceases to disappear.

Special methods are advised by BRAUN and LÜHE. The worms are washed in salt solution, the mucus brushed off, and they are then stretched on slides. A drop of fixing fluid is placed on a coverglass, which is applied with slight pressure. If the worms are large and fleshy they may be pressed between slides by rubber bands. The fixing fluid is run in at one end and drained off at the other. The fixing solution recommended is saturated watery picric acid 50 parts, water 48 parts, glacial acetic acid 2 parts. When the worms are rigid they are removed to dishes of the liquid until they are opaque. After a brief wash in water they are brought up through weak alcohols to 70 per cent. In place of the picric acid solution Müller's liquid may be used (potassium bichromate 2·5, distilled water 100, sodium sulphate 1).

Cestodes may be prevented from tangling by holding them up by the end remote from the scolex and dipping them quickly several times into a jar of fixing fluid. They may be drawn against the side of the vessel after each dipping to exert a slight pull on the strobila.

The fixing fluids should be used cold, as hot fluids render the worms brittle. Bouin's fluid is superior to Zenker's for cytological purposes, but does not yield such straight extended specimens. Specimens may be left in for any length of time without deterioration. Schaudinn's fluid gives good results and specimens should be fixed for ten minutes to half an hour.

A simple method which is good enough for identification but not for cytological work is to pour on to the washed specimens a mixture of 90 volumes of saturated sublimate and 10 volumes of glacial acetic acid.

NICOLL (W.). **Recent Progress in our Knowledge of Parasitic Worms and their Relation to Public Health.**—*Parasitology.* 1922. Dec. Vol. 14. No. 3/4. pp. 378–401.

As this paper is in itself a review, it does not lend itself to abstraction. Reference is made to it, however, on account of the valuable bibliography which it contains.

FLATTELY (F. W.). **Considerations on the Life-History of Tapeworms of the Genus** *Moniezia.*—*Parasitology.* 1922. Dec. Vol. 14. No. 3/4. pp. 268–281.

Since lambs have been found to harbour adult worms at 2–3 months old, they must acquire the infestation very soon after birth. The intermediate host, if any, must be common on the pastures in the spring.

The early appearance of the infestation in lambs suggests the possibility of their contracting it from the ewes, but failure followed an attempt to produce a larval stage in the neighbourhood of the udder by feeding eggs to a ewe.

The parasite occurs frequently in flocks which are free from ecto-parasites. Since several species of Moniezia occur in sheep it appears to be likely that several intermediate hosts are required, but so far no evidence as to the identity of the intermediate host has been obtained in any instance. The possibility is suggested that the eggs may require to go through some process of maturation in the outer world.

The species studied included *M. expansa* (the most numerous), *M. trigonophora*, and *M. alba*.

SONDHI (G.). **Tapeworm Parasites of Dogs in the Punjab.**—*Parasitology.* 1923. Mar. Vol. 15. No. 1. pp. 59–66. With 1 plate & 3 text figs.

The author has made an examination of tapeworms obtained from pariah dogs in Lahore.

Dipylidium was the most abundant and represented 65 per cent. of the total. Of this genus three species were found, *D. walkeri* n.sp., *D. sexcoronatum* von Ràtz, and *D. öerleyi* von Ràtz. A detailed description, with text figures and a plate, is given of the three species.

Three species of multiceps, *M. multiceps* Leske, *M. gaigeri* Hall, and *M. serialis* Gervais, were found.

The genus Taenia was represented by *T. hydatigena* Pallas, and *T. ovis* Cobbold.

Echinococcus was represented by *E. granulosus* Batsch.

HALL (M. C.) & SHILLINGER (J. S.). **Miscellaneous Tests of Carbon Tetrachloride as an Anthelmintic.**—*Jl. Agric. Res.* 1923. Jan. 20. Vol. 23. No. 3. pp. 163–192.

Chickens were found to tolerate doses of 20 cc. per kgm. The evidence of the value of the drug as an anthelmintic is not very conclusive. Rabbits were found to be tolerant of a dose of 5 cc. per kgm., but not of 10 cc. It was administered by a stomach tube.

Dogs are very tolerant of the drug. While 0·3 cc. per kgm. has been found to be the therapeutic dose for whipworms, they have been given up to 16 cc. per kgm. without ill effect. Carbon tetrachloride is useless for tapeworms. It is of the utmost importance that the pure drug be used. The commercial preparation is likely to be poisonous.

Cats are similarly insusceptible to intoxication. In some experiments with pigs the results indicated that 0·6 cc. per kgm. was the necessary dose for the removal of ascarids. It appears to be of little value for the removal of whipworms and nodular worms. The drug should be given in castor oil after 24–36 hours fasting. The experiments indicated, however, that for ascarids oil of chenopodium is effective in smaller doses than carbon tetrachloride.

Satisfactory information with regard to the doses for horses is as yet lacking.

Sheep were given doses up to 48 cc. in 2 oz. of castor oil, and it is claimed that there was complete removal of stomach worms. It is believed, to fit in with the ante- and post-mortem examinations, that the worms must have been killed and digested. It was useless for the removal of tape worms. All the sheep treated were off feed after the administration of the drug. It therefore appears that the safety factor is not large. Details of only two bovines treated with carbon tetrachloride are given, and these would appear to indicate that the drug is dangerous for cattle. The animals used were heifer calves, weighing 175 and 250 lb. One was given 100 cc. in 350 cc. of castor oil, and the other 100 cc. in hard capsules. One died and the other was killed.

BAYLIS (H. A.). **On the Nematode Genus** *Streptopharagus*, **with some remarks on the Genus,** *Spirocerca*.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. Feb. Vol. 16. No. 8. pp. 486–497. With 10 text figs.

The author gives the general characters of the genus *Streptopharagus* and the special features of *Streptopharagus armatus* Blanc, 1912, *S. pigmentatus* (v. Linst. 1897), *S. numidicus* Seurat, 1917, and *S. sudanensis*, sp. n. The generic diagnosis is given for the genus *Spirocerca* and details of *S. sanguinolenta* (Reed, 1819).

RAILLIET (A.). **Les Habronèmes et les Habronèmoses des Equidés.** [Habronemas and Habronemiases of Equines.]—*Rec. Méd. Vét.* 1923. Feb. 15. Vol. 99. No. 3. pp. 65–81.

This article is a resumé of existing knowledge and includes a list of references.

KLEINERT & SCHROEDER. **Filarien in der Haut des Hundes.**—*Berlin Tierärzt. Woch.* 1922. Jan. 1. Vol. 38. No. 1. pp. 1–3. With 2 text figs.

The authors describe two cases in which dogs had a skin disease associated with loss of hair, thickening of the skin, extreme irritation, and the formation of small nodules in its substance. The skin was scaly. Pressure on the nodules caused the escape of a mixture of blood and pus.

Round worms were found in large numbers in this material. These measured 0·17–0·71 mm. in length and 0·014–0·029 mm. in thickness. The anterior end was rounded, and posteriorly they resembled oxyuris.

As the worms were no doubt embryos no identification was possible. The greater part of the article refers to cases previously described.

WARE (F.). **Some Members of the Family Dicrocoelidae affecting Domestic Animals.**—*Jl. Comp. Path. & Therap.* 1923. Mar. Vol. 36. No. 1. pp. 33–39. With 6 text figs.

The author gives detailed descriptions of *Platynosoma fastosum*, Kossack, 1910, and *Eurytrema pancreaticum*, Loos, 1907, and the suggestion is made that *E. pancreaticum* and *E. coelomaticum* should not be classed as different species.

LAGRANGE (E.). **Observations sur les Trématodes d'Indochine.** [The Trematodes in Indo-China.]—*Bull. Soc. Path. Exot.* 1923. Mar. Vol. 16. No. 3. pp. 173–179.

In Southern Annam the buffalo is usually infested with *Fasciola gigantica* and *Paramphistoma explanatum.* A large percentage of cattle harbour *Fasciola gigantica* and *Schistosoma spindalis.*

A number of experiments have been carried out with a view to infecting animals with cercariae found in various snails, but without success.

BETTENCOURT (A.) & BORGES (I.). **Le "*Planorbis metidjensis*" hôte intermédiare du "*Schistosoma haematobium*" au Portugal. Confirmation expérimentale.** [*Planorbis metidjensis*, Intermediate Host of *Schistosoma haematobium* in Portugal.]—*Arcq. Inst. Bact. Camara Pestana.* 1922. Vol. 5. No. 2. pp. 133–135. With 2 text figs.

The existence of a centre of bilharziasis in Europe has been established at Algarve. The only centre previously detected is in Cyprus.

Planorbis metidjensis is the intermediate host.

KOSTYLEV (N.). **Sur les Acanthocéphales de l'Eider** (*Somateria mollissima* **L.).** [The Acanthocephala of the Eider Duck.]—*Parasitology.* 1922. Dec. Vol. 14. No. 3/4. pp. 372–377. With 5 text figs.

The author concludes that there are two Acanthocephala parasitic in the intestine of the eider duck *Filicollis botulus* and *Polymorphus phippsi.* It is impossible to say with which of these *Echinorrhynchus lendix* Phipps is identical. *Filicollis arcticus* (van Cleave) and *Echinorrhynchus pupa* (v. Linstow) are probably identical. The parasites of the eider duck in America are probably identical with those occurring in Europe and Asia.

WARBURTON (C.). **The Warble-Flies of Cattle,** *Hypoderma bovis* **and** *H. lineatum.*—*Parasitology.* 1922. Dec. Vol. 14. No. 3/4. pp. 322–341. With 3 text figs.

In a brief introduction the author points out that although the first proof that the lesion of the skin of cattle known now as warbles is produced by the larva of a fly was furnished 200 years ago, it was not until 1915 that the mode of entry of the parasite was settled.

While lacunae in our knowledge still require to be filled in, the general facts regarding the pest are now known.

The author then passes to a description of the bionomics of *H. bovis* and *H. lineatum* as at present known. Subsequently he discusses the evidence upon which the life-histories have been worked out, and, in the last two sections of his paper, deals with the injuries produced, and the distinguishing features of the two flies.

Both species occur in England, while *H. bovis* is the prevalent species in Ireland and *H. lineatum* in America. In all places where the fly occurs it makes its appearance, at any rate in numbers, at the beginning of the hottest period of the year—in England in July, as a rule, for *H. bovis*, and rather earlier for *H. lineatum.* The latter may be caught as early as April.

H. bovis oviposits on hot sunny days and lays the eggs singly at the base of the hairs. *H. lineatum* is less dependent upon sunshine and may place as many as 14 eggs on a hair. Oviposition generally takes place on the legs.

Yearlings are more parasitized than calves, and these more than adults. The larvae, which hatch out in about 4 days (*H. bovis*) or rather longer (*H. lineatum*), penetrate the skin. During the autumn and winter the larvae appear in a submucous position in the oesophagus, but it is not known how they reach this position. They disappear from this position by March. Some of the larvae in their migrations reach the spinal canal, where they may be found during the winter between the periosteum and the dura mater. From here the final and invariable position under the skin on the back is reached. Here an orifice is made through the skin towards which it directs its hinder end. Growth then takes place rapidly. Most of the larvae quit their subcutaneous position during May and crawl into a hole in the ground. Pupation takes place and lasts about five weeks. The imago then emerges.

In connection with the "gadding" caused by the fly, it is pointed out that oviposition causes no pain, and CARPENTER's explanation (1914) is reproduced that the animals' legs are specially susceptible to the irritation of the repeated attacks of the fly. The flies will not fly over water and cattle frequently protect themselves by making their way into ponds or rivers.

WOODWORTH (H. E.) & ASHCRAFT (J. B.). **The Foot Maggot, *Booponus intonsus* Aldrich, a New Myiasis-producing Fly.**—*Philippine Jl. Sci.* 1923. Feb. Vol. 22. No. 2. pp. 143–156. With 8 plates.

Details are given of 20 cases encountered in the clinic of the College of Veterinary Science of the University of the Philippines. The eggs measure 0·875 mm. by 0·229 mm., and are attached to the hairs by a gelatinous secretion. More than one egg may be found on a single hair and it is exceptional to find them as high on the leg as the knee.

Under laboratory conditions hatching takes place in 3–5 days, and the larva escapes by cutting a small circular flap in the dorsal surface of the anterior end of the egg.

The larvae apparently attempt to penetrate the skin at the place where they are hatched, but many are found around the coronary band and in the heels. They bury themselves nearly parallel with the surface, with their hinder ends exposed. The larval period apparently ranges from two to three weeks. When full grown they emerge, drop to the ground, and bury themselves for pupation. The pupal period is about 10 days. The imago escapes by splitting the operculum in the middle line and pushing the two halves aside as flaps.

The adult flies have not previously been observed, but would not appear to be rare.

Cases have been observed mostly during the dry season, and this is probably explained by the fact that during the wet season the animals spend most of their time in water or mud. For the same reason, Herefords are more frequently attacked, as they are dry pasture animals. Maggot specimens have so far been obtained from Hereford, Nellore, and Philippine cattle, carabaos, and goats.

The paper includes a detailed description of *Compsomyia dux*, the common screw worm of the Philippines, with which the maggot is most likely to be confused. But such descriptions do not lend themselves to abstraction and should be consulted in the original by those interested. The treatment suggested is as follows :—Cleanse the area with soap and water, clip the hair closely to get rid of the eggs. Remove as many maggots as possible, and apply a chloroform pack for 24 hours. This should be followed by heavy applications of pix liquida every third day, until the lesions are healed. The pack may be dispensed with if the infestation is recent, so that the pix liquida can be applied to the maggots.

During the dry season the animals should be inspected daily, and they should have as free access as possible to water as mud on the legs makes it difficult for the fly to attach its eggs.

ALDRICH (J. M.). **A New Genus and Species of Fly reared from the Hoof of the Carabao.**—*Philippine Jl. Sci.* 1923. Feb. Vol. 22. No. 2. pp. 141–142.

The fly described in this paper was reared from maggots obtained from the feet of carabaos.

The fly has been named *Booponus intonsus*, n.gen., n.sp.

It appears to be allied to Cordylobia.

FERRIS (G. F.). **Observations on the Larvae of some Diptera Pupipara, with Description of a New Species of Hippoboscidae.**—*Parasitology.* 1923. Mar. Vol. 15. No. 1. pp. 54–58. With 4 text figs.

As stated by the author in his opening paragraph, he makes a small but interesting addition to the scanty literature on the subject of the Diptera Pupipara, and describes a new species in the Hippoboscidae—*Ornithomyia strigilecula*.

HOWARD (L. O.). [**Report of the Entomologist (1921–22).**]—*U.S. Dept. Agric.* Washington. 1922. 32 pp. [Summarized in *Rev. Applied Entom.* 1923. June. Vol. 11. Ser. B. Pt. 6. pp. 92–93.]

Dried egg is proving a convenient and successful bait for traps for screw-worm flies and blow-flies coming to wounds on animals. Warble maggots in their later stages are being destroyed by application of 1 part iodoform to 5 parts of vaseline to the lesions made by them. Derris is promising as an insecticide dusted on animals infested with lice and fleas, particularly in climates where dipping is risky in winter.

BUXTON (P. A.). **On Predicting the Seasonal Prevalence of an Insect.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. Feb. Vol. 16. No. 8. pp. 465–468. With 1 text fig.

The author draws attention to the fallacies inherent in the method of considering temperature and humidity separately in connexion with the occurrence of insects, and points out that there is a close relationship between the two.

By plotting the conditions of temperature and humidity favourable to any particular insect and the monthly temperature-humidity points for the particular place, the probable prevalence of an insect can be predicted.

NEVEU-LEMAIRE (M.). **L'évolution de la classification des Culicidae.** [The Evolution of the Classification of the Culicidae.]—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Apr. Vol. 1. No. 1. pp. 90–107. With 4 text figs.

This paper contains a survey and critical examination of the various classifications published since, and including, that of THEOBALD in 1901.

A set of diagrams is given showing how the five sub-families, Megarhininae, Uranotaeniinae, Anophelinae, Sabethinae, and Culicinae, can be distinguished.

DELANOË (P.). **De la repulsion exercée par le mouton sur les puces.** [The Repulsion of Fleas by Sheep.]—*Bull. Soc. Path. Exot.* 1923. Feb. Vol. 16. No. 2. pp. 96–97.

The author brings forward further evidence that fleas do not remain in the neighbourhood of sheep. He suggests the possibility that the natural grease is repulsive to them, and proposes to try the effect of it for protecting himself next hot weather in Morocco.

BAYLIS (H. A.). **Report on a Collection of Parasitic Nematodes, mainly from Egypt. Part I. Ascaridae and Heterakidae. Part II. Oxyuridae. Part III. Camallanidae, etc., with a Note on** *Probstmayria* **and an Appendix on** *Acanthocephala.*—*Parasitology.* 1923. Mar. 22. Vol. 15. No. 1. pp. 1–13. With 4 text figs. [15 refs.] pp. 14–23. With 3 text figs. [8 refs.] pp. 24–38. With 8 text figs. [11 refs.].

CAWSTON (F. G.). **Some Notes on the Differentiation of Closely-Allied Schistosomes.**—*Parasitology.* 1922. Dec. Vol. 14. No. 3/4. pp. 245–247.

DAUBNEY (R.). **Note on the Genus Diaphanocephalus (Nematoda : Strongylidae), Parasitic in Reptiles, with a Description of Three New Species.**—*Parasitology.* 1923. March. Vol. 15. No. 1. pp. 67–74. With 4 text figs. and 1 plate.

FAUST (E. C.). **Note on Larval Flukes from China.**—*Parasitology.* 1922. Dec. Vol. 14. No. 3/4. pp. 248–267. With 2 plates.

KOTLÁN (A.). **Avian Cestodes from New Guinea. II. Cestodes from Casuariformes. III. Cestodes from Galliformes.**—*Ann. Trop. Med. & Parasit.* 1923. April. Vol 17. No. 1. pp. 47–57. With 5 text figs. pp. 59–69. With 7 text figs.

STEKHOVEN (J. H. S.). **De Bloedzuigende Arthropoda van Nederlandsch Oost-Indië.** [The Blood-sucking Arthropods of the Dutch East Indies]. (I) *Hippobosca maculata,* and (II) *Hippobosca Equina.*—*Nederlandsch-Indische Bladen voor Diergeneesk. en Dierenteelt.* Vol. 34. No. 2/3. pp. 128–220. With 3 plates and 1 map.

BACTERIAL DISEASES.

PANISSET (L.). **Les rapports du microbe de la fièvre mediterranéenne et du bacille de l'avortement épizootique.** [The Relationship between the Bacillus of Mediterranean Fever and that of Epizootic Abortion.]—*Rev. Gén. Méd. Vét.* 1923. June 15. Vol. 32. No. 378. pp. 293–298.

This paper is a brief review of the present state of knowledge regarding the relationship between the two organisms.

The important question as to cross immunity has not yet been satisfactorily settled. There appears to be one fundamental point of difference and that is that while it is quite certain that *M. melitensis* is pathogenic for man, there is no evidence to show that *B. abortus* is, and experiments have indicated that it is not.

NEWSOM (I. E.) & CROSS (F.). **An Outbreak of Haemorrhagic Septicaemia in Sheep.**—*Jl. Amer. Vet. Med. Assoc.* 1923. Mar. Vol. 62. No. 6. pp. 759–762.

The authors draw attention to the loose manner in which outbreaks of disease have been diagnosed as haemorrhagic septicaemia in recent years.

The disease broke out among a batch of 3,000 lambs. They had been moved a journey occupying eight days. Within a few days a few were noticed to be ill. Discharge from the nose and crusted lips were the most noticeable symptoms. Within the first fortnight some 200 were ill and 50 had died.

Many of the carcases sent to the experimental station for examination showed consolidation of the lungs. Haemorrhages were shown by a smaller proportion. Gastritis and enteritis were seldom seen, and scouring was not a noticeable symptom. The disease continued for a further week and the total number of deaths was 116.

Some sick lambs were penned with 2,000 other lambs which had been received about two weeks previously, and as far as could be determined the disease did not spread to other lambs. Thirty-four rabbits were inoculated with tissue emulsions from the same number of lambs and in 32 instances a bipolar organism was obtained in pure culture from their blood. The two rabbits which did not yield cultures survived the inoculations. The remainder all died within three days.

CAHILL (A.). **Septicaemia haemorrhagica in Cattle.**—*Cornell Vet.* 1923. Apr. Vol. 13. No. 2. pp. 148–155.

This paper is a plea for more careful diagnosis of cases described as haemorrhagic septicaemia upon insufficient evidence.

KÜ (N.), SATO (S.), NAKAMURA (Y.) & TAGUCHI (K.). **On the Infectious Abortion of Mares in Kamikita District, Aomori Prefecture, Japan.**—*Jl. Jap. Soc. Vet. Sci.* 1923. Mar. Vol. 2. No. 2. [Authors' English Abstract.] pp. 57–59.

Abortion is known to have occurred among the mares at the Government stud during the years 1913–15, but no investigation was carried out until 1920.

Ten aborted foals were examined. In eight cases no pathological changes were found in the foetus or in the placenta, and culture media remained sterile or showed only contaminations. In the remaining two cases an organism resembling paratyphoid B. was isolated.

As a result of certain serological tests the authors conclude that the bacillus is *B. abortus equi*.

TRAUM (J.). **The Relation of Colostrum to Immunity of New-born Calves.**—*Cornell Veterinarian.* 1923. Apr. Vol. XIII. No. 2. pp. 135–148.

Among other subjects, the author reviews the literature regarding the passage of agglutinins from cows affected with contagious abortion to their calves through the medium of the colostrum, and summarizes the results as follows :—

1. Colostrum carries immune substances.
2. These when ingested by the new-born will be absorbed and can be detected in the blood in an unchanged condition within an hour or two.
3. Immune bodies disappear rapidly from the milk as lactation advances. The decrease begins after the first milking or nursing and after the fourth milking they can no longer be detected by serologic tests.
4. The ability of the young to absorb, in an unchanged condition, the immune bodies when ingested rapidly disappears.
5. The ingestion of colostrum will suppress the activities of bacterium coli and will in most cases prevent its reaching the organs and prevent coli-septicaemia, a commonly recognised disease in the first two days of calf life.

OKUDA (K.). **On the Prophylactic Value of Iodized Tetanus Toxin.**—*Jl. Jap. Soc. Vet. Sci.* 1923. Mar. Vol. 2. No. 1. pp. 91–92.

The author has tested the method described by VALLÉE and BAZY in 1917.

The tetanus toxin was obtained by growing the bacillus in "liver-piece broth" with the addition of 10 per cent. of fresh blood (of any species). The lethal doses of this toxin were as follows :—Mouse, 0·00001–0·000005 cc. ; guinea-pig, 0·0001–0·00005 cc. ; rabbit, 0·001 cc.

The solution of iodine was 1 part of iodine, 2 of potassium iodide in 200 of water. The mixture of this solution with the toxin in the proportions recommended by VALLÉE (2 of toxin to 1 of iodine) was found to be dangerous for guinea-pigs and rabbits. A mixture of equal parts was found to be quite safe. Three injections of 1, 2, and 4·5 cc. of this mixture effectively protected guinea-pigs.

Rabbits are easier to immunize than guinea-pigs, a single injection sufficing. In goats immunity was produced by two injections of 2 cc. Sheep and horses were immunized by two injections of 5 cc.

The iodized toxin retained its prophylactic properties for about 40 days after the mixture was made.

WALBUM (L. D.) & MÖRCH (J. R.). **L'importance des sels métalliques dans l'immunisation et en particulier dans la production de l'antitoxine diphtérique et de l'agglutinine pour le** *B. coli.* [The Importance of Metallic Salts in Immunization, and in Particular in the Production of Diphtheria Antitoxin and *B. coli* Agglutinin.] —*Ann. Inst. Pasteur.* 1923. Apr. Vol. 37. No. 4. pp. 396–442.

It is impracticable to summarize this long paper, which abounds in experimental details, but the authors' resumé may be abbreviated as follows :—

During immunization the chlorides of magnesium and cobalt, when injected intravenously, produce a marked increase in the antitoxic power of the serum of goats immunized against diphtheria.

The injections of metallic salts have an immediate effect upon the antitoxin content of the serum, even during the negative phase. If injections of metallic salts are stopped during a period between successive bleedings there is a rapid drop in the antitoxin content of the serum, but the content rises again when the injections are restarted. If this process of withholding and restarting injections is repeated the manganese gradually exerts less and less effect.

The administration of the salt *per os* is without effect.

The injected manganese disappears rapidly from the circulation, and is excreted mainly by the intestinal mucosa. In simple immunization the only organ to show any change in its manganese content is the liver, in which the amount is reduced to about one-quarter of the normal. When manganese is injected the organs show an increase in content of the salt, which is proportional to the amount injected.

The amount of *B. coli* agglutinin is influenced by the two salts in different ways. There appears to be some connexion between the effect produced and the number of atoms of the metal injected. It may be directly or inversely proportional, according to the group to which the metal belongs.

In other experiments Walbum and DERNBY found that metallic salts had no effect upon passive immunity.

NAINSOUTA. **Un nouveau cas de tuberculose bovine aux Abattoirs de Dakar.** [A New Case of Bovine Tuberculosis at the Abattoir at Dakar.]—*Bull. Soc. Path. Exot.* 1923. Mar. Vol. 16. No. 3. p. 207.

The author records the occurrence of tubercular lesions ranging in size from a nut to a fist in the lungs of a zebu. The bronchial and mediastinal glands were also greatly enlarged, and tuberculous. The diagnosis was confirmed by microscopic examination.

LEGER (M.) & BAURY (A.). **De l'emploi de la Chauve-Souris comme animal réactif dans la peste.** [The Bat as a Test Animal for Plague.]—*Bull. Soc. Path. Exot.* 1923. Feb. Vol. 16. No. 2. pp. 78–79.

The authors have found it impossible to acclimatize white mice or rats in Senegal, and the wild rats are unsuitable, because of the danger in handling them and because of the possibility of coming upon rats that are immune as a result of a previous infection. Bats are easy to catch during the day time and the authors have never found a flea on any one that they have handled.

The bat, *Nyctinomus pumilus*, is very susceptible to inoculation with the bacillus of Yersin.

MATHIS (C.). **La Musaraigne, réservoir de virus pesteux au Cambodge.** [The Shrew, a Reservoir of Plague in Cambodia.]—*Bull. Soc. Path. Exot.* 1923. Mar. Vol. 16. No. 3. pp. 158–159.

The author confirms KÉRANDEL's observation that the shrew may act as a reservoir for plague in Cambodia.

This species (*Crocidura murina*) forms about 10 per cent. of the animals caught by the sanitary service. Its ectoparasites belong mainly to the species *Xenopsylla cheopis*.

MYCOTIC DISEASES.

MITCHELL (C. A.). **Bovine Oidiomycosis.**—*Report Vet. Dir. Gen., Dept. Agric. Canada for year ending Mar. 31, 1922. Appendix I.* pp. 37–38.

An outbreak of disease resembling foot and mouth disease occurred among some cattle. From the lesions was isolated an oidium which was found to be capable of setting up disease in rabbits by subcutaneous inoculation. The period of incubation varied from 12 days to 3 weeks. No systemic lesions were developed, and the skin lesions generally cleared up in about 10 days.

Guinea-pigs and rats appeared to be immune.

A calf inoculated subcutaneously in the neighbourhood of the coronary band developed slight skin lesions and the lymphatics became enlarged. The infection cleared up rapidly.

The organism is gram-positive. When growing under favourable conditions, small chains with evidence of branching are formed. When the medium becomes dry spores form in the interior of the organism.

It grows well on ordinary media and on Sabouraud's agar. On agar the colonies are at first white, but later become red. It does not ferment any sugars.

KIKUCHI (K.). **Über einen Fall von Blastomykose beim Pferde.** [A Case of Blastomycosis in a Horse.]—*Jl. Jap. Soc. Vet. Sci.* 1923. Mar. Vol. 2. No. 1. [Author's German Translation.] pp. 4–5. With 1 plate.

The horse had shown slight bleeding from the nose, which had ceased without treatment, at different times for a period of seven months. Then swelling appeared over the frontal and maxillary sinuses, associated with a copious muco-purulent discharge. At the post-mortem a large tumour-like mass was found filling the sinuses. It was pale yellow in colour and of a myxomatous consistence. Examination of sections revealed the presence of large numbers of rounded bodies, ranging from 5–25 μ in diameter, with double-contoured envelopes and refractile granules scattered through their contents.

Culture and inoculation experiments yielded negative results.

DISEASES DUE TO FILTERABLE VIRUSES.

VAN SACEGHEM (R.). **Le principe lytique et la peste bovine.** [The Lytic Principle and Rinderpest.]—*Bull. Agric. Congo Belge.* 1922. Sept.–Dec. Vol. 13. No. 3–4. pp. 609–611.

The author refers briefly to the two main theories regarding the nature of the lytic principle (d'HERELLE's phenomenon) and expresses his own inclination to the view that it is not in the nature of a living virus, since it has been shown by BORDET and CIUCA to be capable of resisting the action of chloroform for eight hours.

He has set himself to answer the question whether the lytic principle plays any part in the diseases caused by ultra-visible viruses and comes to the conclusion that it certainly exerts some influence on the virus of rinderpest.

A number of bovines were inoculated with 1 cc. of virulent blood, and they were given *per os* macerations of fresh faeces of a recently recovered animal in water at 35° C. daily from the day of inoculation until the febrile reaction had subsided. The quantity administered daily was 2 litres. A tabular statement indicates that three animals were treated in this way. All showed elevations of temperature to 40° C. or higher 4 or 5 days after inoculation. All recovered and none showed any evidence of intestinal disturbance.

Since bacteria play some part in the production of lesions in diseases due to ultravisible virus, van Saceghem performed an experiment for the purpose of ascertaining whether the lytic principle acted on the bacteria or the virus itself. From the heart blood of animals dead of rinderpest *B. coli* and *B. perfringens* were cultivated. A maceration of faeces from a recovered animal were passed through a filter and the filtrate was found to be without effect upon the cultures. The conclusion drawn is that the lytic principle acts upon the virus, and while it prevents intestinal complications it does not pass the intestinal mucous membrane.

The author finds in this a new economical and easily applicable treatment for rinderpest.

CURASSON (G.). **Iso-anaphylaxie chez les bovidés producteur de sérum contre la peste bovine.** [Iso-Anaphylaxis in Cattle producing Anti-Rinderpest Serum.]—*Rev. Gén. de Méd. Vét.* 1923. June 15. Vol. 32. No. 378. pp. 302–307.

The occurrence of iso-anaphylaxis in animals has been placed on record by a number of authors. In 1910 ALEXANDRESCU and CIUCA had 10 per cent. of cases among 70,000 animals treated with anti-anthrax serum. Only one animal died.

GERLACH encountered similar results among animals vaccinated against anthrax by the Sobernheim method. NICOLAS and RINJARD observed accidents of the same nature in animals hyper-immunized intravenously against rinderpest.

In 1921 DEVANELLE and Curasson saw similar cases in Poland. The author records accidents of the same kind occurring at Bamako. In his cases the symptoms made their appearance several days after injection of large quantities of blood. The symptoms were hurried respiration, salivation, paleness of the mucous membranes with petechiae, rapid weak pulse, no rise of temperature, and muscular tremors. These lasted for at most three hours. Motions were mixed

with blood. Death took place within 5 hours of the onset of symptoms. Only one survived out of 14.

The lesions were haemorrhages in the gastro-intestinal tract, paleness of the liver, slight softening but no change in volume of the spleen, haemorrhages in the kidney, and in the interior of the bladder, and serous membranes. The lungs were oedematous. Haemorrhages were present in the muscular masses. The blood clotted slowly.

BÜRGI (M.). **Rinderpest.**—*Schweizer Arch. f. Tierheilk.* 1923. Mar. Vol. 65. No. 3. pp. 121–138.

This paper gives an account of the outbreak of rinderpest in Belgium in 1920, regarding which accounts have already appeared in a number of journals.

ROBERT (M.). **Sur une complication de la fièvre aphteuse.** [A Complication of Foot and Mouth Disease.]—*Rev. Vétérinaire.* 1923. May. Vol. 75. No. 5. pp. 290–292.

The occurrence of cardio-pulmonary disturbances as sequels to foot and mouth disease has already been placed on record by HAMOIR.

The author has noted that certain animals after they have apparently recovered from foot and mouth disease begin to waste and after about a month or two a progressive breathlessness sets in, and actual spasms of suffocation may be seen. After a time affected animals present a peculiar appearance in that no matter what the season be the animals' coats are thick as in winter. This, the author thinks, is characteristic of the disease.

Contrary to what was observed by HAMOIR, Robert has been able to devise a simple and effective method of treatment.

Whatever the time of the year the animals are clipped all over, and this alone effects a great improvement in their condition, and are then treated with strychnine sulphate, veratrine sulphate and brandy.

In milch cows in which milk has been suppressed a return of secretion occurs and increases until it approaches the normal.

VALLÉE (A.) & RINJARD (P.). **Recherches sur la prévention de la rage du Chien après morsure.** [The Prevention of Rabies in the Dog after having been Bitten.]—*Rev. Gén. Méd. Vét.* 1923. Apr. 15. Vol. 32. No. 376. pp. 165–174.

This paper contains an account of experiments carried out with a view to ascertaining whether dogs previously inoculated with rabic virus can be protected against infection.

The method selected was that of MARIE, a method involving the use of a large dose of fixed virus, which has been exposed to the action of antirabic serum for 24 hours, followed after an interval of a fortnight by a large dose (about 5 gm.) of fixed virus alone. The dogs used were kept under observation for some months in order to eliminate the possibility of natural infection. They were then inoculated by two punctures into the lip (resembling natural bites) with street virus. Half of the dogs, 18 in number, were left as controls, and the other 18 were treated with the serum virus mixture three days later, and with street virus a fortnight afterwards.

One of the controls died of gastritis and of the remaining 17 seven died of rabies.

Of the dogs subjected to the protective treatment five died. In three instances rabies was diagnosed clinically and microscopically, but in two of these cases inoculation failed to cause infection in rabbits. The other two dogs died of enteritis, and their brains were negative on inoculation.

It is concluded that the serum-virus method may prevent the development of rabies provided there is no excess of serum and a considerable dose of vaccine is used. The inoculation is not without risk. An objection to it is that it must be carried out at an Institute where rabies work is done, and also it is against the method that absorption is very slow and septic conditions are likely to make their appearance.

Toxic effects are likely to be produced either by the virus or by the heterologous brain tissue.

DA SILVA (E. P.) & FIGUEIRA (L.). **Le traitement antirabique à l'Institut de Bactériologie Camara Pestana en 1915, 1916, 1917, 1918, 1919 et 1920.**— *Arq. Inst. Bact. Camara Pestana.* 1922. Vol. 5. No. 2. pp. 231–243.

This paper contains valuable statistics regarding the treatment of patients during the years mentioned.

BRIDRÉ (J.) & BOQUET (A.). **La vaccination anticlaveleuse par virus sensibilisé après dix années d'application.** [Vaccination against Sheep-pox by Sensitized Virus.]— *Ann. Inst. Pasteur.* 1923. Mar. Vol. 37. No. 3. pp. 229–233.

During the period of ten years that has elapsed since the authors put their method of vaccination against sheep-pox, by means of sensitized virus, to practical applications, over eight million sheep have been treated in Algeria, 500,000 in France, and 200,000 in Morocco and Tunis. The method is also in use in Greece, Spain and Italy and is the only official one for the treatment of sheep for importation into France.

The extensive use of the method has furnished valuable evidence of its efficacy. Immunity is established within 48 hours and lasts for more than a year, but the limits of its duration have not been established. Secondary lesions of sheep-pox have never been detected, and in no case has the infection been conveyed to healthy flocks by vaccinated animals. The local lesion which is produced shows no tendency to spread, nor does it act as a source of contagion. A complete and durable immunity is established, even when no local reaction occurs.

When symptoms of infection have made their appearance the application of the vaccine exercises no influence on the course of the disease. Similarly animals in the incubative stage will develop the disease. In these two sets of sheep the disease will run its course of 15 days, but the outbreak will then come to a stop.

Serum treatment is not applicable in sheep-pox because the period of passive immunity is very variable. If it is desired to confer active immunity after serum administration there is a chance of giving the vaccine too soon or too late. If too soon, it will not protect, and if too late further cases will develop and thus the course of the outbreak is prolonged.

Serum is, however, valuable therapeutically. It may arrest mild cases and lessen the severity of others.

Vaccination may be carried out at any time. A few cases of abortion have followed the operation, but any connection between the two has not been definitely established. Ewes in milk may have a slight reduction in quantity during the febrile period, but not sufficiently marked to be of any consequence. Vaccination of pregnant ewes has resulted in protection of the lambs provided these are born at least five days after the treatment. The same dose 0·2 cc. is used for animals of all ages.

NAGAO (M.). **Die statistischen Beobachtungen über die Inkubationsstadien und den Verlauf bei der infektiösen Blutarmut der Pferde.** [The Period of Incubation and the Duration of the Disease in Equine Pernicious Anaemia.]—*Jl. Jap. Soc. Vet. Sci.* 1923. Mar. Vol. 2. No. 1. pp. 101–106. [Author's German Translation.]

In inoculation cases of pernicious anaemia the period of incubation varies from 2 to 47 days, but in 70 per cent. of these it falls between 9 and 22 days. The dose of blood inoculated does not influence this. The period for which the virus has been kept and the age of the animal also have no influence on the period of incubation.

In 38 per cent. of cases a single relapse occurred. Two relapses were observed in 24 per cent. of the cases, and in 21 per cent. three relapses. A minority of the animals had from 4–9 relapses.

In fatal cases the temperature rises a few days before death, but, as a rule, it does not exceed 41·5° C. during the course of the disease.

In about 60 per cent. of cases prognosis is unfavourable, and in about 50 per cent. the disease terminates fatally.

MISCELLANEOUS.

BALFOUR (A.). **Observations on Wild Rats in England, with an Account of their Ecto- and Endoparasites.**—*Parasitology.* 1922. Dec. Vol. 14. No. 3/4. pp. 282–298. With 2 plates and 3 text figs.

The aim of this investigation was to find, if possible, some organism which would cause abortion in rats and thus assist in checking their multiplication. This main object was not achieved, but a certain amount of information regarding the parasites of the rat was collected. A new species of Hymenolepis was discovered, and it was found that *Heligmosomum braziliense* is present in rats in England.

It has been shown that the guinea-pig may act as a carrier of *Leptospira icterohaemorrhagiae* without marked evidence of ill health and some evidence has been adduced that infection may take place through the alimentary tract.

The Leptospira was cultivated on Wenyon's modification of Noguchi's medium. Cultures made from heart blood were found to be teeming with the organism after 48 hours at 30° C., and such organisms remained viable for two to three months. Early cultures were virulent for the guinea-pig, but after repeated subculture some of the virulence was lost, but even after a year a rise of temperature with jaundice resulted. Recovery followed.

LANGERON (M.). **Les oscillariées parasites du tube digestif de l'homme et des animaux.** [Oscillaria Parasitic in the Intestines of Man and Animals.]—*Ann. Parasit. Humaine et Comparée.* Paris. **1923.** Apr. Vol. 1. No. 1. pp. 75–89. With 6 text figs.

This paper contains a description of algae found in the intestines of man and certain animals, which are held to be parasitic. The parasites belong to the genus *Oscillospira*.

CRAIG (J. F.) & KEHOE (D.). **Chronic Haematuria of Cattle in Ireland.** —*Jl. Dept. Agric. Tech. Instruct. Ireland.* 1923. Feb. Vol. 22. No. 4. pp. 375–377.

The authors have had for observation and post-mortem examination two cows affected with chronic haematuria. They find that these animals were not affected with redwater due to Babesia, but that the condition is one of haematuria and not haemoglobinuria. The blood gains access to the urine in the bladder and some irritant is believed to be the original cause of the condition. The authors have not been able to negative the findings of HADWEN.

BOULAY (A.). **Mode simplifié de préparation des éthers éthyliques de l'huile de Chaulmoogra.** [A Simplified Method of Preparing the Ethylesters of Chaulmoogra Oil.]—*Bull. Soc. Path. Exot.* 1923. Feb. Vol. 16. No. 2. pp. 151–155.

JURITZ (C. F.). **The Colouring of White Arsenicals used in Stock Dipping.**—*Jl. Dept. Agric. (S. Africa).* 1923. March. Vol. 6. No. 3. pp. 253–264.

WOODCOCK (H. M.). **"Rickettsia"-bodies as a Result of Cell-digestion or Lysis.**—*Jl. Roy. Army. Med. Corps.* 1923. April. Vol. 40. No. 4. pp. 241–269. With 9 text figs.

REPORTS.

JAVA. **Jaarboek van het Departement van Landbouw, Nijverheid en Handel in Nederlandsch-Indië, 1921.** [Annual Report of the Department of Agriculture, Industry and Commerce, Dutch East Indies, 1921.]—1922. 213 pp. Batavia: Ruygrok & Co. [Price 3 fl.]

Chapter XII. [Annual Report of the Veterinary Laboratory at Buitenzorg.] [pp. 113–123.] [By BUBBERMAN (C.).]

In Chapter XII of this report are given details of the output of various sera, vaccines, etc., from the Laboratory during the year 1921.

It is stated that 49,150 cc. of serum and 6,625 cc. of vaccine against gas gangrene were supplied. Experiments are being continued in this connexion, with a view to the introduction of filtered cultures. The cryptococcus of epizootic lymphangitis has been isolated, and it appears to be identical with the organism occurring in Europe and elsewhere.

"Bayer 205" is being used experimentally for the treatment of surra, but as yet no definite results are available for record. There appears to be some doubt regarding both the therapeutic value, and the freedom from danger of this drug.

The occurrence of what appears to be a new disease is recorded among buffaloes. It is characterized by fever and diarrhoea, followed by eczema. The disease is transmissible by blood inoculation and so far as has been discovered is caused neither by a piroplasm nor a trypanosome.

Chapter XIII. [Annual Report of the Civil Veterinary Service.] [pp. 124–171.] [By VAN DER SCHROEFF.]

In Chapter XIII is given the Annual Report of the Veterinary Service.

From this it may be gathered that experience shows that the incidence of surra among buffaloes and horses varies in different districts. In some areas (West Coast of Sumatra) the species are about equally attacked. In other districts (Toba District) only buffaloes are affected. In Padang, Angkola and elsewhere the disease is observed among horses only.

A change of pasture from one infested with Tabanidae to one free from them has frequently proved effective in checking the spread of the disease in a herd.

At the Government breeding station losses amounting to 20 per cent. occurred among cattle imported from British India from Piroplasmosis (*B. bigeminum*) and Anaplasmosis. An improved diet and frequent dipping were effective in checking the mortality.*

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* From a summary by Dr. N. H. SWELLENGREBEL.

REVIEW.

VELU (Henri). **Les piroplasmes et les piroplasmoses.**—*Mémoires de la Société des Sciences Naturelles du Maroc.* 1922. Dec. 1. Vol. 2. 285 pp. With 32 text figs. Paris : 11, rue Victor-Cousin, chez Emile Larose, Editeur. [Price 25 frs.]

The appearance of this volume is welcome as it brings together the information available regarding a most important group of diseases. The author does for the Piroplasmoses what his fellow countrymen, LAVERAN and MESNIL, did for the Trypanosomiases.

The volume is divided into two main parts dealing respectively with what may be called the generalities of the subject and accounts of the individual organisms and the diseases produced by them. Each part occupies approximately half the book. It need not be said that parasites belonging to the genera *Theileria*, *Anaplasma*, and other intra-corpuscular parasites are dealt with.

As is usual in French works, the name Babesia is not used save in connection with synonyms.

The volume contains a valuable bibliography, amounting to 25 pages, of the more important papers published during the last 20 years.

The author has rendered valuable service to all those interested in this group of diseases.

A. L. Sheather.

TROPICAL DISEASES BUREAU.

TROPICAL VETERINARY BULLETIN.

VOL. 11.] November 30, 1923. [No. 4.

DISEASES DUE TO PROTOZOAN PARASITES.

PAN-AFRICAN VETERINARY CONGRESS. **Specific Animal Diseases. Trypanosomiasis Tsetse Bionomics.**—*The Farmers' Journal.* Nairobi. 1923. May 10, 17 & 24. Vol. 5. Nos. 19, 20 & 21. pp. 24–30; 28–29; & 9.

RICHARDSON (Uganda) emphasizes the difficulties of dealing with trypanosomiasis partly owing to lack of knowledge and in part on account of shortage of staff for field work. No accurate figure can be given for the annual losses among cattle, but it is probably not less than 10,000 head.

Three morphologically distinct trypanosomes are recognizable in Uganda: *T. brucei*, *T. congolense* and *T. vivax* (with a subgroup, *T. uniforme*).

T. brucei is non-pathogenic to cattle. *T. vivax* causes loss of condition and reduction of milk, and has been held to be responsible for heavy losses by death in the field, but in no case has it been responsible for death in animals kept under observation at the laboratory at Entebbe. *T. congolense* usually proves fatal, the disease running its course in about two months.

Losses are caused in Uganda in two ways. The first is extension of the tsetse areas, and the second the spread of the disease into areas believed to be tsetse-free. The latter is the more important. While there are probably undetected tsetse areas, outbreaks have been detected in places where tsetse have not been discovered. Outbreaks in such areas are usually observed after extension of a fly belt and the consequent movement of cattle. In these cases Tabanidae and Stomoxys have been held responsible, but the former are often so scanty as to make it highly improbable that they are concerned to any large extent. On the other hand, infected cattle have been taken into stations where Stomoxys is very prevalent without starting an outbreak.

The difficulty of diagnosis complicates the problem. *T. vivax* and *T. congolense* can, as a rule, be discovered, but cases have occurred in which daily examinations have failed to reveal *T. congolense* up to two months and *T. vivax* up to three months.

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Treatment has been adopted in some cases with success. Intravenous injections of tartar emetic have given the best results, but relapses or reinfections make this method of control of little value. In any case the course of treatment is too long to be of practical value on a large scale.

Glossina palpalis readily conveys *T. vivax* and *uniforme*, but does not appear to play an important part in the transmission of *T. congolense*.

HORNBY agreed with RICHARDSON that infected cattle might be taken into a Stomoxys area without causing an outbreak. He agreed that Stomoxys, as a blood-sucking fly, might act as a mechanical transmitter of trypanosomiasis, but was of the opinion that Tabanus, Haematopota and Pangonia were more important. The disease is rarely maintained indefinitely by mechanical transmission only.

With regard to *T. brucei*, HORNBY agreed that it is not pathogenic for cattle, but pointed out that cattle may act as a reservoir. This is a factor in the problem of trypanosomiasis in man. Emphasis was laid upon the necessity of investigating the alleged immunity to trypanosomiasis among certain local races of cattle throughout Africa.

MCCALL (Tanganyika) described the distribution of the tsetse areas:—

1. *The Coastal Zone.*—This zone is most important. Although this area comprises one-fifth of the entire country, it is estimated that it contains only some 20,000 head of cattle which are localized in fly-free areas.

2. *Western Zone.*—This zone is some 900 miles in length, and measures 390 miles at its widest part. It is not a solid block of tsetse country, but contains numerous fly areas. It runs from north to south, and is separated from the coastal zone by the highlands of the interior.

Apart from these two large areas there are other fly belts scattered throughout the territory. Inaccurate knowledge regarding the extent and existence of fly belts makes any opinion as to the expansion or contraction of these impossible in most cases. There are, however, areas in which definite expansion is known to be proceeding.

MCCALL thinks that the solution of the tsetse problem lies in the future expansion of population with their flocks and herds, with the associated clearing of land.

G. morsitans is the common fly of the country, although other species are encountered. *G. pallidipes* comes second in order of frequency and *G. brevipalpis* third. *G. longipennis*, *G. fusca*, *G. austeni* and *G. swynnertoni* are also known to occur.

Mechanical transmission by Stomoxys and Tabanidae is not the common method.

Subsequently there was some discussion which does not lend itself to abstraction.

YAKIMOFF (W. L.). **Au sujet de la trypanosomiase des chameaux russes.** [Trypanosomiasis of Russian Camels.]—*Bull. Soc. Path. Exot.* 1923. May 9. Vol. 16. No. 5. pp. 314–319.

Although this paper is a résumé of the author's previous publications regarding trypanosomiasis of camels in Russia, and includes the work done by SCHOUKEWITSCH, OURANOFF, PETROWSKY, and MIROTWORSKY, it is perhaps convenient to abstract it.

Trypanosomiasis in Russian camels was first detected by FEINSCHMIDT in 1912 in Astrakhan, and since that date the geographical distribution of the disease has been gradually mapped out. It has

most recently been discovered in Saratov. The causal parasite is of the nagana type, and from the measurements given by Yakimoff would appear to be monomorphic.

LAVERAN & MESNIL, on the grounds of cross immunity tests, have expressed the opinion that the parasite is not identical with *T. brucei*, *T. equiperdum*, *T. evansi*, or *T. soudanense*.

Clinically the disease is a chronic one, and may last up to two years. Weakness, discharge from the eyes (in some cases) and progressive enlargement of the lymphatic glands are the most obvious symptoms. In some cases elevations of temperature of brief duration are the only evidence of infection. The presence of trypanosomes in the blood is very irregular. The parasite is inoculable to a number of animals. In rats, mice and dogs the infection produced is acute ; in horses, rabbits and guinea-pigs subacute, and in ruminants chronic, and terminates in recovery.

Nothing definite is known regarding the reservoir of the virus, but Yakimoff disagrees with OURANOFF, who believes that the parasite maintains itself in cattle, and incriminates the camel. The manner in which the transmission is effected under natural conditions is also not known.

Tartar emetic and salvarsan are said by Yakimoff and WASSILEWSKY to be of value in the treatment of the disease. Trypanblue and dianyl-blue have not yielded favourable results. MIROTWORSKY, on the other hand, has found salvarsan and atoxyl useless.

YAKIMOFF (W. L.). **Au sujet du** *Trypanosoma ninae kohl-yakimov*. —*Bull. Soc. Path. Exot.* 1923. Apr. 11. Vol. 16. No. 4. pp. 249–252.

In this paper the author reviews some of the literature regarding the clinical symptoms of camels affected with surra and debab, and distinguishes these from the symptoms presented by camels affected with trypanosomiasis in Turkestan.

The differences between the infections are expressed in tabular form as follows :—

	Russian Trypanosome.	*T. evansi.*	*T. soudanense.*
Camel ..	Oedema	Oedema	No oedema
Horse ..	No oedema	Oedema	Little or none
Cattle ..	Mortality not known	25–30% fatal	?
Sheep ..	Fatal	Sometimes fatal	Fatal
Goats ..	Fatal	Recovery	Frequently recovery
Pigs ..	Fatal	?	?
Dogs ..	Oedema	Eye lesions	No oedema Eye lesions
Rabbits ..	No oedema	No oedema	Oedema

On these grounds he considers that *T. ninae kohl-yakimov* stands as a species.

HOARE (C. A.). **On a Trypanosome occurring in British Sheep, and its Transmission by the Sheep Ked.**— *Vet. Jl.* 1923. Aug. Vol. 79. No. 8. pp. 271–274. With 1 text fig.

A fuller account of this parasite and its transmission has appeared elsewhere and has already been dealt with. [See this *Bulletin*, 1922, Nov., Vol. 10, No. 4, pp. 107–108.]

IWANOW (E.). **Experiments in the Disinfection of Sperm in Mammals, especially in relation to Dourine in Horses.**—*Parasitology.* 1923. June. Vol. 15. No. 2. pp. 122–127.

The author has carried out experiments in which the effects of radium and ultra-violet rays upon the semen of mammals were tested. The records of these tests have probably been destroyed, but Iwanow states that both these agencies gave bad results. Radium, although not causing loss of motility in the spermatozoa, destroyed their fertilizing power. Ultra-violet rays left spermatozoa still potent provided a large amount of semen was used, and the rays did not penetrate the whole layer of the liquid. Under such conditions any infective agent in the semen would also survive.

Experiments with chemical agents :—

Alcohol was found to be more destructive to spermatozoa than *T. equiperdum.* Semen containing 10 per cent. alcohol was found to be active in fertilization. In 20–25 per cent. alcohol some trypanosomes could be found which were still motile after 80 minutes' exposure. Spermatozoa cease movement immediately in 20 per cent. alcohol.

Atoxyl.—*T. equiperdum* remains infective in the presence of 8–10 per cent. atoxyl. A combination of 5 per cent. atoxyl in saline and 5 per cent. alcohol slightly weakens but does not destroy the infective power of the trypanosome.

Salvarsan (Arsol, Arsaminol) and *Neosalvarsan.*—Dilutions of 1 : 10,000 of these drugs in saline fail to kill trypanosomes after 15 minutes but deprived them of their infectivity, probably owing to inhibition of multiplication. Neosalvarsan gave similar results in five minutes. The results were the same with Arsaminol in 1 : 20,000. Arsol when added to dog's semen in concentrations up to 1 : 1,000 does not appear to affect the motility after 30 minutes. More prolonged exposure has an increasing effect upon the motility.

With spermatozoa of the horse, Arsol in 1 : 10,000 appears to be almost without effect up to two hours' exposure.

Protocols of some experiments are given in which *T. equiperdum* was acted upon by Arsol, Neosalvarsan, and Arsaminol before inoculation. Arsol in 1 : 10,000 for 15 minutes rendered *T. equiperdum* incapable of infecting mice.

The same result was obtained with neosalvarsan in the same dilution.

Arsaminol in dilutions of 1 : 25,000, 1 : 50,000, and 1 : 100,000, with 30 minutes' exposure, failed to render *T. equiperdum* non-infective for mice.

T. equiperdum subjected to 1 : 20,000 of Arsol for 30 minutes was found to be incapable of infecting three rabbits.

The author points out that it may be possible to apply these results to the control of dourine.

RUPPERT (F.). **Die prophylaktische Anwendung von "Bayer 205" bei Trypanosomeninfektion groszer Haustiere.** ["Bayer 205" as a Prophylactic against Trypanosomiasis in the Larger Domesticated Animals.]—*Berlin. Tierärzt. Woch.* 1923. Aug. 9. Vol. 39. No. 32. pp. 369–370.

The author puts on record a small number of experiments in which rabbits were injected with the drug prior to being inoculated with trypanosomes, and others in which rabbits which had been cured of

dourine were reinoculated with other trypanosomes. It was found that in doses of 0·4 gm. per kilog. the drug protected the rabbits against inoculation with *T. equiperdum*, *T. equinum* and *T. brucei* for periods up to six months, but that death from trypanosomiasis occurred when the period elapsing between the injection of the drug and inoculation was longer.

In countries where trypanosomiasis occurs, drugs which are capable of curing infection but which leave the animal open to reinfection are of no value. What is required is some method by which more or less durable resistance to the infection can be established.

With a view to testing the toxicity of "205" eleven horses were injected with doses ranging from 1·5 to 0·25 (gm.) per hundredweight (pro Zentner). From these experiments it was found that the maximum tolerated dose was 0·75, but that this produced symptoms in two out of three animals. It is noted that these symptoms resembled those of chronic trypanosomiasis, swelling of the legs, head and genitals, facial paralysis, and plaques. In view of these results eight horses (healthy) were injected with doses ranging from 0·25 to 0·75 gm. (pro Zentner), and after varying intervals were inoculated with trypanosomes.

A dose of 0·5 gm. was found to be effective for protection when the infective inoculation was given after an interval of a month.

The next question to which an answer was sought was whether the dose which prevented infection up to one month—that is to say, a period amounting to twice the incubation period of the inoculated infection—would be effective for the cure of existing disease. Details of five horses treated are given, and from these it appears that 0·5 gm. pro Zentner is sufficient to effect a cure.

As it was thought possible that a real cure had not been effected and that trypanosomes had been cleared from the circulation only, one of the cured animals was killed and its bone marrow used for the inoculation of guinea-pigs. None of the latter became infected.

The author thinks that the bad results reported by some other authors must have been due to incorrect dosage. He thinks it unlikely that a drug which in the case of mouse experiments has a chemotherapeutic index of 1 : 400 should in the case of chronic mal de caderas have an index of 1 : 2, as has been reported.

VAN SACEGHEM (René). **Action des composés de bismuth sur la trypanosomiase.** [The Action of Certain Bismuth Compounds in Trypanosomiasis.]—*Bull. Agric. Congo Belge.* 1923. June–Sept. Vol. 14. Nos. 2–3. pp. 394–396.

The drugs used were bismuth hydroxide and tartro-bismuthate of potassium and sodium. The former was injected intramuscularly in suspension in olive oil (1 gramme in 2 cc.).

Two cattle infected with *T. congolense-pecorum* var. *ruandae* were given 10 cc. The injection was without effect in either animal.

An intravenous injection of 5 grammes of the sodium-potassium salt in 50 cc. of distilled water caused death within a few minutes. In the second case the drug was administered progressively. The first dose was ·5 g. in 10 cc. This was followed by 1 g. and 1·5 g. These did not cause disappearance of the trypanosomes from the circulation. Two grammes produced a fatal result within a few minutes.

The same drug was then tried suspended in oil as an intramuscular injection (1 gramme in 2 cc.), and in a second case the suspension was

administered subcutaneously. These injections were without effect upon the trypanosomes, but the subcutaneous injection caused a local inflammatory reaction, which subsequently subsided.

VAN SACEGHEM (R.). **Les trypanosomes pathogènes dans le liquide cephalo-rachidien.** [Pathogenic Trypanosomes in the Cerebro-Spinal Fluid.]—*Bull. Agric. Congo Belge.* 1923. Mar. Vol. 14. No. 1. pp. 58–59.

Van Saceghem has examined liquid obtained by lumbar puncture from cattle in all stages of infection with *T. congolense-pecorum* and has failed to detect them. Moreover, such liquid has not produced infection in guinea-pigs inoculated with it.

The paralysis and other symptoms of nerve disorder seen in this trypanosomiasis are apparently due to toxins, since there are no discoverable lesions in the central nervous system. The paralysis is an important point in connexion with the spread of the disease. *T. congolense-pecorum* is spread by blood-sucking flies mechanically, and the paralysis leaves the animals without defence against the attacks of the flies. The latter are therefore able to acquire a heavy infection.

VAN SACEGHEM (R.). **Le pouvoir attachant du "*Trypanosoma congolense-pecorum*" variété "*ruandae*" pour les hématies.** [The Power of *T. congolense-pecorum* var. *ruandae* for attaching itself to Corpuscles.]—*Bull. Agric. Congo Belge.* 1923. Mar. Vol. 14. No. 1. pp. 49–50.

In fresh specimens of blood containing the trypanosome the parasites are found for the most part to be attached to corpuscles by their anterior end. If a few cubic centimetres of such blood (defibrinated) are placed in a tube of simplified Novy medium and a specimen is examined after 24 hours, it is found that the parasites are not attached to the corpuscles.

The author thinks that the parasites have lost their power of fixing themselves on to the corpuscles, since they show evidence of degeneration.

The author revives the suggestion that *T. congolense-pecorum*, which is not an active trypanosome in the sense of changing its location, attaches itself to corpuscles for the purpose of being carried along in the blood-stream and so distributed throughout the body.

FRANCHINI (G.). **Action des latex végétaux sur différents protozoaires. Culture de trypanosomes dans les latex.** (2e **Note.**) [The Effect of Vegetable Latex upon Certain Protozoa. The Cultivation of Trypanosomes in Latex.]—*Bull. Soc. Path. Exot.* 1923. Apr. 11. Vol. 16. No. 4. pp. 256–263.

The author records the results obtained in further experiments in connexion with the action of latex upon protozoa and the cultivation of trypanosomes in the liquid.

The trypanosomes used in the experiments were: *T. equinum*, *T. pecaudi*, *T. marocanum*, *T. rhodesiense*, *T. cruzi* and *T. lewisi*. In addition to these the following protozoa have been used: *Crithidia melophagi*, *Crithidia gerridis*, the amoebae of dysentery, *Lamblia* (*Giardia*) *hominis* and *muris*, *Trichomonas* and *Cercomonas hominis*, Trichomonas, Hexamitus and Tetramitus of the mouse.

The plants providing the latex were: *Euphorbia mamillaris, Eu. drupifera, Eu. nereifolia, Eu. biglandulosa, Eu. calyculata, Eu. laro, Eu. grandidens, Asclepias curassavica, Gomphocarpus fruticosus, Hoja-fraterna, Alstonia scholaris, Strophanthus hispidus, S. rigali-cornu, Plumeria alba, Tanghina venenifera, Funtumia elastica, Lacoocha artocarpus,* and *Ficus glabella.*

The technique employed was the same as that used in the experiments already reported [see this *Bulletin*, 1923, May, Vol. 11, No. 2, p. 53].

In view of the number of protozoa and plants used it is impossible to abstract briefly the results obtained with the different combinations. Further, it is difficult to gather from the details supplied what were the exact results obtained, for the reason that in many cases particulars of only one observation of the cultures are given. It appears to be a general rule, however, that the trypanosomes do not retain their motility for more than 48 hours. In some cases the organisms appeared to perish without undergoing any alteration in morphology, while in others trypanosomes became leishmaniform. *T. cruzi*, however, in the latex of *Plumeria alba* and *Euphorbia calyculata* showed some multiplication after incubation for a fortnight at 26° C., and parasites were still more numerous after a month.

T. lewisi is more difficult to cultivate in latex than *T. cruzi*. Other trypanosomes did not yield cultures. The Crithidia appeared to retain their vitality in latex longer than trypanosomes.

Amoebae, Lamblia, and intestinal protozoa retain their vitality for variable periods.

The extraordinary rapidity of growth of some of the intestinal bacteria in latex leads the author to suggest the possibility of its use as a culture medium.

LAVERAN (A.) & FRANCHINI (G.). **Expériences sur les flagellés de la punaise du chou.** [Experiments with Flagellates from the Cabbage Bug.]—*Bull. Soc. Path. Exot.* 1923. May 9. Vol. 16. No. 5. pp. 319–323. With 2 text figs.

The authors find that in the intestine of the red cabbage bug (*Pentatoma ornatum*) there may be found flagellates belonging to the genera *Herpetomonas* and *Crithidia*, which are capable of producing slight infections in young white mice inoculated intra-peritoneally. On a single occasion cultures from the blood of an infected mouse on N.N.N. medium yielded small round and oval organisms. These did not develop into flagellates.

VELU (H.) **Les Piroplasmoses du bétail marocain.** [Bovine Piroplasmoses in Morocco.]—*Rec. Méd. Vét.* 1923. Apr. 30. Vol. 99. No. 8. pp. 158–159.

During the year 1922 *Piroplasma bigeminum, Anaplasma marginale,* and *Piroplasma bovis* have been detected among imported animals during the summer months.

Investigation of the parasites found in indigenous animals has led the author to the following conclusions:—

1. A form of bovine theileriasis exists which appears to be the common piroplasmosis of indigenous cattle.

2. This disease is transmissible in series by subcutaneous or intravenous inoculation with blood taken during paroxysms.

3. There may be only a slight glandular reaction without "blue bodies" being discoverable, or it may be marked, and associated with the presence of "blue bodies."

4. The causal parasite may be present in the corpuscles up to 95 per cent., depending upon the severity of the case. It persists in the blood after apparent recovery.

5. In very severe cases there may be jaundice. Acute cases in which parasites are present in the blood in considerable numbers may escape unnoticed since no external symptoms are presented. Chronic forms of the disease may be characterized by diarrhoea and cachexia after the parasites have disappeared from the circulation.

The disease is a theileriasis similar in all respects to Egyptian fever, but it is premature to identify it with East Coast fever.

ZELLER & HELM. **Versuche zur Frage der Übertragbarkeit des Texasfiebers auf deutsche Rinder durch die bei uns vorkommenden Zecken** *Ixodes ricinus* **und** *Haemaphysalis punctata cinnabarina.* [The Transmissibility of Texas Fever to German Cattle by *Ixodes ricinus* and *Haemaphysalis punctata cinnabarina.*]—*Berlin. Tierärzt. Woch.* 1923. Jan. 4. Vol. 39. No. 1. p. 4.

Early in January, 1921, 733 cows and 30 calves arrived in Bremen from America. As the great majority had come from Texas it was certain that some carriers of redwater infection would be included.

On arrival a blood smear was made from every animal, and these were distributed to a number of institutes for examination. In no case could a definite diagnosis of Texas fever be made, although bodies suspected of being piroplasms were found in some of the smears.

Two German cows were inoculated intravenously with some of the suspected blood, and a week later they developed the disease. Parasites were found in their blood. Subsequently further inoculations confirmed the existence of Texas fever among the imported animals.

In view of the absence of information as to whether Texas fever could be transmitted by ticks occurring naturally in Germany, a number of experiments were carried out with *I. ricinus* and *H. punctata cinnabarina.*

The results indicated that at no stage of development could the progeny of female ticks which had been fed upon infected animals transmit the infection to German cattle in the case of *Ixodes ricinus.* It was found, however, in the case of this tick that larvae, the progeny of adults engorged upon the American cattle, were capable of transmitting anaplasmosis.

In the case of *H. punctata cinnabarina* the larvae and nymphs derived from adults fed upon American cattle were not found to be capable of transmitting Texas fever. It was found, however, that the adults of ticks of which the adults of the previous generation and the nymphs had engorged themselves upon Texas fever infected animals were capable of transmitting the infection to German animals.

WENYON (C. M.). **Coccidiosis of Cats and Dogs and the Status of the** *Isospora* **of Man.**—*Ann. Trop. Med. & Parasit.* 1923. July. Vol. 17. No. 2. pp. 231–288. With 6 plates & 2 text figs.

Dealing with the literature regarding the occurrence of coccidia in cats and dogs, the author points out that almost without exception the view has been held that only one species of coccidium was parasitic

in the cat or dog. There has been no proof furnished regarding the identity or otherwise of these.

Wenyon's own observations have revealed the existence of at least three species of Isospora in these animals. They are readily recognizable by their size alone. They measure 12–15μ, 25–30μ, and 40–45μ, respectively, in their long diameter. It appears to be probable that the smallest parasite—*Isospora bigeminum*—is not the same in the cat and the dog, since that found in the dog is, on an average, half as large again as that occurring in the cat.

It is known that dogs are sometimes the hosts of a parasite belonging to the genus *Eimeria*. This parasite is remarkable for the great variation in size of the mature oocyst. In this respect the organism resembles *Eimeria debliecki* of the pig.

Isospora felis.—The salient points of the life-cycle of this parasite are as follows: The schizonts retain an elongated gregariniform shape throughout their existence. They give rise to eight merozoites, as a rule, but the number is not absolutely constant.

The microgametocyte, like the schizont, retains a gregariniform shape for a considerable length of time. After division of the nucleus into a number of smaller nuclei the formation of microgametes begins by the outgrowth from the nucleus of a short process; this is followed by elongation of the whole nucleus. It has been calculated that more than 2,000 microgametes may be derived from a single microgametocyte.

The macrogametocyte, like the phases already described, retains its elongated shape, and this may lead to the parasite becoming doubled on itself. A number of deeply staining irregular bodies appear in the cytoplasm, which is itself filled with vacuoles containing a clear refractile material. The dark-staining granules subsequently disappear, and the envelope is secreted round the parasite. This envelope does not appear to acquire its full thickness until the organism leaves its epithelial cell.

This parasite invades the epithelium only, and appears to limit its invasions to the cells covering the summits of the villi.

The oocysts measure 39–48μ by 26–37μ. No development of the oocyst takes place until it has been voided in the faeces.

Isospora bigemina.—This parasite is peculiar in that it is not an invader of epithelial cells, but of the subepithelial tissues, and also in that the oocysts undergo complete sporulation while still in the tissues of the host. Owing to its small size the stages of development are very difficult to make out in sections, but the life-cycle appears to run parallel with that of other coccidia. It is noted that in the sporulated oocyst the envelopes surrounding the sporocysts are distinctly thicker than the oocyst.

Isospora rivolta.—This parasite has been studied in the oocyst stage as found in the faeces of the dog. In this phase the parasite resembles *Isospora felis*, but is smaller. The measurements are 20–24μ in length by 12–15μ in breadth.

Eimeria canis.—This parasite was recorded by BROWN & STAMMERS. As already mentioned, the oocysts are very variable in size. It ranges from 18–45μ in length by 11–28μ in breadth. The oocyst is described as having a distinct pink tinge, and what seemed to be the true oocyst wall was enclosed in a somewhat irregular thick membrane, which gradually peeled off during development outside the body.

It has been suggested that *Eimeria canis* is identical with *Eimeria stiedae*.

The paper concludes with a valuable bibliography.

REITSMA. (K.). **Coccidiosis der Ziege.** [Coccidiosis of the Goat.]—*Zeitschr. f. Infektionskrankht. parasit. Krankht u. Hyg. d. Haustiere.* 1923. July. Vol. 25. No. 1. pp. 50–63. With 2 plates.

The author records the occurrence of fatal coccidiosis of goats in Holland. Coccidiosis was diagnosed in 12 cases out of 85 goats examined post-mortem, and in nine of these death was probably due to the infection.

The parasite may be responsible for a fatal infection in young animals, but adults do not succumb to it.

In two cases necrotic foci were found in the liver, and microscopic examination of these showed that they were composed of degenerated liver cells and coccidia. Contrary to what is the case in the rabbit parasites were not found in the epithelium of the bile ducts, but in the liver cells themselves. This suggests to the author that the invasion of the liver took place via the blood-stream.

The principal lesion found in the intestine took the form of chalky-white granular-looking nodules, ranging in size from a pin's head to 3–4 mm. in diameter. They were generally more or less rounded in shape. They were raised about 2 mm. above the level of the mucous membrane, were firm to the touch and sharply circumscribed. On section these lesions were found to be essentially of a proliferative character.

SPIEGL (A.). **Beitrage zur Pathologie der Schafkokzidiose und zur Entwicklung des Schafkokzids.** [A Contribution to the Pathology of Coccidiosis of the Sheep, and the Development of the Coccidium.]—*Zeitschr. f. Infektionskrankht. parasit Krankht. u. Hyg. d. Haustiere.* 1923. May. Vol. 24. No. 4. pp. 316–325. With 1 plate.

The author refers to two outbreaks of the disease which came under his notice.

The types of parasites found in the lesions are described.

With regard to the control of the disease he advises that the animals should be placed in clean stables daily, as in experiments it was found that sporulation may take place as early as the 35th hour.

PHISALIX (Mme.). **Coccidiose des voies biliaires d'un lézard de la famille des Scincidés le** *Scincus officinalis* **Laur.** [Hepatic Coccidiosis of a Lizard belonging to the Family Scincidae.]—*Bull. Soc. Path. Exot.* 1923. June 13. Vol. 16. No. 6. pp. 408–409.

The coccidium was found invading the liver and gall bladder only, and in adults. The invasion appeared to be of some standing because no schizogonous phases were observed. The oocysts measured from 31–35μ by 18–20μ. They were irregularly ellipsoidal in shape. The membrane was very thin and permeable to stains. The contents were finely granular, and contained a central refractile nucleus.

In the next phase the contents had shrunk to a central ball-like mass, the enclosing membrane was thicker and was definitely double-contoured. It was impermeable to stains.

The parasite was tetrasporous, the processes of sporoblast, sporocyst, and sporozoite formation following the ordinary course.

WALZBERG. **Zur pathologischen Histologie der natürlichen Toxoplasmose des Zeisigs.** [The Pathological Histology of Naturally Contracted Toxoplasmosis of the Greenfinch.]—*Zeitschr. f. Infektkrankht. parasit. Krankht. u. Hyg. d. Haustiere.* 1923. July. Vol. 25. No. 1. pp. 19–33. With 2 plates.

Until recently toxoplasmosis was considered to be confined to tropical and subtropical countries, but evidence is accumulating that it is at least not uncommon in Europe. It has been reported in the squirrel in England, in the chaffinch in France, and the author now records its occurrence in the greenfinch in Germany. The first case was observed there in 1919, and subsequently a number of the birds (19) were obtained from the same source for experiment. Of these 10 were found to be infected. The intestine and pancreas were the principal seats of the parasite, but they were found in the liver, spleen, and occasionally in smears from the lungs and kidneys. There were no very marked lesions in the affected viscera. The spleen, however, was three or four times the normal size.

Microscopic examination was made of sections from the brain, muscles, spleen, liver, kidneys, lungs, and intestine.

The author was unable to find the parasite in sections of the brain. This is in direct contradiction to ARANTES' findings of toxoplasma in large numbers in the brains of experimentally infected pigeons. Similarly, Walzberg failed to confirm ARANTES' findings of parasites in the head muscle and gizzard wall.

The spleen showed thickening of the capsule and trabeculae. Toxoplasma was present in large numbers, usually as a rounded or pear-shaped structure, either included within cells, or lying free.

In the liver the columnar arrangement of the cells is distorted by cellular infiltrations. The interlobular vessels were congested. Parasites were found free in the blood-stream or included within cells. The liver showed some degree of fatty degeneration.

The kidneys showed parenchymatous degeneration, but parasites were very scantily present.

The lungs were congested, and parasites were present in very small numbers only.

The intestinal vessels showed marked congestion, and the tissues appeared to be oedematous.

VERGE (J.). **L'entéro-hépatite des Dindonneaux.** [Entero-hepatitis (Blackhead) of Turkeys.]—*Rev. Gén. Méd. Vet.* 1923. Aug. 15. No. 380. pp. 421–429.

The author summarizes existing knowledge of this disease, but has nothing new to add.

FRANCHINI (G.) & SAINI (M.). **Sur la présence d'Hémogrégarines chez les poissons d'eau douce de France.** [The Presence of Haemogregarines in Fresh-water Fish in France.]—*Bull. Soc. Path. Exot.* 1923. May 9. Vol. 16. No. 5. pp. 353–361. With 2 text figs.

DESCHIENS (R.). **Variations tinctoriales et morphologiques de** *Giardia intestinalis.* [Variations in the Morphology and Staining Reactions of *Giardia intestinalis.*]—*Bull. Soc. Path. Exot.* 1923. May 9. Vol. 16. No. 5. pp. 323–325. With 1 text fig.

LIGNIÈRES (J.). **Sobre los experimentos de transmisión de la piroplasmosis bovina a ovinos efectuados en la República Oriental del Uruguay.** [A Criticism of the Experiments carried out in Uruguay regarding the Transmission of Bovine Piroplasmosis to the Sheep.]—*Revista Zootécnica.* 1923. July 15. Vol. 10. No. 118. pp. 193–195.

MARCHOUX (E.). **Action du Stovarsol contres les Lamblies.** [The Effect of Stovarsol (Oxyaminophenylarsenic Acid) on Lamblia (Giardia).]—*Bull. Soc. Path. Exot.* 1923. May 9. Vol. 16. No. 5. pp. 325–326.

DISEASES DUE TO METAZOAN PARASITES.

JACK (R. W.). **Tsetse Fly. A Four Years' Experiment in Game Elimination.**—*Rhodesia Agric. Jl.* 1923. Apr. & June. Vol. 20. Nos. 2 & 3. pp. 207–223. With 1 map; pp. 329–348.

The author records observations made during the course of an experiment carried out over four years, in which the effect upon the tsetse-fly of vigorously hunting big game was tested. The area covered was approximately 500 square miles.

Nearly 5,000 head of game were killed, but there was no approach to extermination, on account of immigration of animals into the area.

The operations resulted in approximate banishment of big game during the daytime from the haunts of the fly. The fly diminished greatly in numbers throughout the area, and apparently disappeared completely from a considerable part of it. This disappearance appeared to be effected more readily in the accessible portions of the area, but the fly persisted more tenaciously in broken or thick country or in country which, on account of the absence of permanent water, was not hunted so thoroughly. The extension of the fly area, which had been steadily progressing for years, appeared to come to a stop in the experimental area during the first year of operations. Extension continued on either side of it.

There appeared to be no doubt that the destruction of the game was directly responsible for the checking of the fly, indicating that *G. morsitans* is dependent upon large game.

Although the operations did not succeed in actually clearing any area of flies, the author thinks that the results obtained in the more open areas were such as to suggest that in favourable localities, or where land is valuable, the elimination of *morsitans* by organized hunting might not prove uneconomic. The cost of the author's experiment amounted to 4½ pence per acre (presumably for the whole period).

BROWN (W. G.). **Sheep Blow Fly Pest. A Review of Experiments since 1913.**—*Queensland Agric. Jl.* 1923. July. Vol. 20. No. 1. pp. 13–14.

The material contained in this note has appeared elsewhere [see this *Bulletin*, 1923, Feb., Vol. 11, No. 1, p. 17].

VAN SACEGHEM (René). **L'Oestre du Mouton au Ruanda.** [*Oestrus ovis* in Ruanda.]—*Bull. Agric. Congo Belge.* 1923. June–Sept. Vol. 14. No. 2–3. p. 393.

Oestrus ovis is found in Ruanda at the beginning of the rains (September–October) and during the rainy season. The parasite is the cause of serious losses among sheep and goats.

CAMPBELL (J. G. C.). **The Stickfast Flea.**—*Western Australia Dept. of Agric. Bull.* No. 104. pp. 1–16. With 8 text figs.

The stickfast flea (*Echidnophaga gallinacea*) is a parasite of poultry, and has caused immense losses in Western Australia. It was first described by WESTWOOD, in 1875, who examined specimens from Ceylon. Its existence has since been recorded in Russia, Italy, China, Japan, in many parts of Africa, Mexico, the United States, and Hawaii. In Australia it is only known to be the cause of loss in Western Australia.

The parasite belongs to the same family as the "Jigger" or "Chigoe." The genus *Echidnophaga* is represented by nine species, of which five have been found in Australia.

While it is only three years since the flea was identified, general opinion is that it has been known as a cause of losses for many years.

Unlike most of the fleas, the stickfast flea shows a remarkable impartiality as regards its hosts. Its preference for fowls is probably due to the fact that the habits of the bird are favourable to it, but any species of animal may become parasitized by it. Dogs and cats are the most likely hosts after the fowl. It has been found on a wide range of animal and bird hosts, and man is not exempt from its attacks.

On both birds and animals the fleas tend to congregate where there is little or no covering of feathers or hair. In poultry the bare parts of the head are the principal areas of attachment. In cats they are found round the eyes and mouth and between the toes.

The fleas bury their mouth parts into the host, leaving the body projecting at right angles to the surface.

The symptoms produced depend upon the severity of the infestation, and are due to the withdrawal of blood

The parasite is not known to be a carrier of disease, but it is worthy of note that it has been found on rats during plague epidemics.

Life-history.—For development to maturity a period of about four weeks is required. The eggs are oval in shape and measure about 300 μ in length. Hatching requires about four days. The resulting larva measures about a millimetre in length, and comprises 13 segments, excluding the head. There is a ring of hairs round the hinder margin of each segment, and the cuticle is tuberculated. The head has a pair of short, thick antennae, and a mouth provided with strong jaws. The habitat of the larva is beneath the surface of the soil. During the larval period two or three moults occur, and when full grown the larva measures about three millimetres in length.

Pupation takes place about 6 in. below the surface of the soil, and the pupal period lasts about 14 days.

The adult flea is dark brown in colour and when newly hatched measures only about one millimetre in length. Females, after fertilization, increase in size, and as the egg masses develop in the abdomen, become paler in colour.

The stickfast flea differs from ordinary fleas in that it remains attached to its host by its proboscis, and does not wander about, biting only when it requires to feed. In consequence of this habit the legs are not so powerful as in ordinary fleas. Observation goes to show that egg-laying is for the most part accomplished during the night, and that a meal of blood is necessary before a female can lay eggs.

The duration of life is variable. Life appears to be limited to about a week during hot weather, but may be longer during the winter. When food is abundant females outlive the males, and may lay eggs for three to six weeks. Males rarely survive a week after mating. When fleas are starved the females are first to succumb.

During development a temperature of 80° F. and a humidity of 80 degrees were found to be most favourable. An excess of moisture in the soil is fatal to the larvae.

Experiments with Insecticides.—Limewater was found to be destructive to the eggs. The vapours of 5 per cent. solution of phenyle, and carbolic acid, 2 per cent. cyllin, kerosene, kerosene emulsion, camphor, and naphthalene were found to be fatal to larvae.

Various greasy and oily substances were found to be effective for the destruction of the mature fleas. It was not necessary to mix any disinfectant with them.

DUNN (Lawrence H.). **The Ticks of Panama, their Hosts, and the Diseases they transmit.**— *Amer. Jl. Trop. Med.* 1923. Mar. Vol. 3. No. 2. pp. 91–104.

This paper contains an account of the species of ticks received by the author at the Ancon laboratory and identified with certainty.

Argas miniatus.—Prefers the fowl, but attacks other hosts. Larvae remain attached while engorging, but nymphs and adults feed at night. It is known to transmit *Spironema gallinarum.*

Ornithodorus talaje.—This parasite is known as the human tick in the adult stage. Larvae and nymphs attack the black and the brown rat.

Dermacentor nitens.—The tropical horse tick. This tick usually attaches itself to horses or mules, but is occasionally found on other hosts. The inside of the ears is the predilection place of attachment.

The preoviposition period is 5–7 days. Oviposition takes from 8–16 days, and the shortest period of incubation recorded is 25 days. It is probably the transmitting tick of equine piroplasmosis in Panama. DARLING (1913) recorded the occurrence of *P. caballi.*

Rhipicephalus sanguineus.—This tick is exceedingly common on dogs in Panama. The usual places of attachment are between the toes and in the ears. The tick transmits canine piroplasmosis, a commonly occurring disease on the Isthmus. The screw-worm fly, *Chrysomyia macellaria,* frequently deposits its eggs in the lesions caused by the bites of this tick.

Ixodes ricinus.—Only one specimen of this tick has been examined.

Margaropus annulatus.—This is the transmitting tick of Texas fever in the Southern United States. It has been found in Panama, but is not common.

Margaropus annulatus australis.—This appears to be a variety of the above, and is to be found on practically all cattle in the zone. It is sometimes found on dogs.

The tick transmits *B. bigemina,* and practically all the native cattle are infected with this parasite.

Haemaphysalis leporis-palustris.—Is not a commonly occurring parasite of the rabbit and hare in Panama.

Haemaphysalis kochi.—Has been found on deer.

Amblyomma cajennense.—The most common species of Amblyomma found. It attacks man and all species of animals indiscriminately. It has not been incriminated in the transmission of disease.

Amblyomma darlingi.—This differs in minor details only from the above.

Amblyomma americanum.—The lone star tick. Found on dog and hog on an island in Panama Bay, but not yet recorded from the mainland.

Amblyomma dissimile.—Is the prevalent tick on cold-blooded animals.

Amblyomma longirostre.—This tick has been found on porcupines. It is notable for the deep penetration of the mouth parts into the skin while engorging.

Amblyomma nodosum.—The three-toed ant-eater is a common host of this tick in its adult phases. Larvae and nymphs have not been found.

Amblyomma varium.—This tick is frequently found on the two-toed sloth. An engorged female was found to measure 30 mm. in length, 24 mm. in width, and 15 mm. in thickness. It weighed nearly 6 grammes.

Amblyomma humerale.—Found on a tortoise.

Amblyomma parvum.—The adults of this species were found on a white-tailed deer. Larvae and nymphs were collected in large numbers from cotton rats.

Amblyomma naponense.—Found on an ant-eater and a collared peccary.

Amblyomma ovale.—Specimens were obtained from an ant-eater.

MacArthur (W. P.). **Tick Paralysis.**—*Jl. Royal Army Med. Corps.* 1923. Aug. Vol. 41. No. 2. pp. 81–86.

Cases of tick paralysis observed by Nash in British Columbia are recorded in this paper.

The ticks live on the sage brush of the uncultivated land. When they attach themselves to human beings the head and the nape of the neck are favourite locations. Four cases of paralysis in human beings associated with the presence of a tick on the body are referred to.

Ticks sent for identification were found to be *Dermacentor venustus*, but no definite statement was received that these had been collected from patients.

The greater part of the paper is a recapitulation of the literature on tick paralysis.

The symptoms in human beings are: An acute, flaccid, ascending motor paralysis without sensory changes. In general, it commences in the legs, but in severe cases the muscles of the trunk, arms, head, and neck may be involved with interference with speech and deglutition. Prognosis is favourable and recovery rapid if the tick be removed before the muscles of respiration are involved.

Rabagliati (D. S.). **An Outbreak of Demodectic Mange in Cattle.**—*Vet. Jl.* 1923. Aug. Vol. 79. No. 8. pp. 275–280.

The outbreak occurred among a herd of Egyptian bulls (with a few Cyprus steers) used for cattle-plague serum production. The animals were in good condition and were kept under good hygienic conditions.

The ground on which the mat-covered sheds stood had been used for cattle for many years prior to the war. During the war it was used as a horse remount depot.

The first case occurred about two months after the sheds had been again taken over for serum work. In spite of repeated clippings and dressings with oil and sulphur preparations a cure was not effected. The animal remained in contact with other animals for 23 months without any other case being discovered. Four and a half months after this bull had been destroyed two further cases occurred, but these were in sheds remote from each other and from the shed in which the original case had occurred. At intervals of a few weeks further cases were found, and with a view to accurate determination of the extent of the invasion all the animals (110 in number) were cast and carefully examined. It was found impossible to make a satisfactory examination

while the animals were in the standing position. Forty-eight per cent. were found to be infected, although many of these had not more than two or three pustules.

In no case did the disease produce any pruritus, and in one case only was there any denudation or thickening of the skin. The nodules ranged in size from a millet seed to a pea. From the larger ones yellow caseous pus could be obtained by pressure alone, but the smaller ones required incision.

In no case was there any elevation of temperature. Pustules were found on almost all parts of the body with the exception of the head and the legs below the knees and hocks.

Oil and sulphur dressings were found to be useless. Subcutaneous injections of arrhenal were also found to be inefficacious. Finally, spraying and dipping with Cooper's dip (1–150) were practised weekly and fortnightly, and were continued until improvement occurred.

The difficulty of detecting slight cases raises the question as to whether the disease is as rare as is believed in cattle. In view of this difficulty it cannot be said with certainty that the first case detected was the first or even the only case of infection at that time.

Since the outbreak was apparently stamped out other cases have occurred, and some of these among animals introduced after the apparent cessation of the original outbreak. There appears to be no doubt that these animals became infected after purchase. This indicates the difficulty of eliminating the disease from infected premises.

SALM (G.). **Sur un nouveau Trombidiide,** *Schöngastia salmi* **(n. sp.).** [A New Trombidiid, *Schöngastia salmi* n. sp.]—*Bull. Soc. Path. Exot.* 1923. May 9. Vol. 16. No. 5. pp. 336–340. With 2 figs.

This Trombidium, of which, in spite of continual searching, only one specimen has been discovered, was found at Magelang, in Java. Its host is unknown.

NOC (F.). **Sur l'embryon acariforme et les stades larvaires des Linguatulidés.** [The Acariform Embryo and the Larval Stages of the Linguatulidae.]—*Bull. Soc. Path. Exot.* 1923. May 9. Vol. 16. No. 5. pp. 340–346. With 6 text figs. and 1 plate.

As a result of his investigations regarding the embryo and larval forms of *Armillifer armillatus*—parasitic on pythons in West Africa—a species of *Raillietiella* from the gecko, in Cochin-China, and of a *Linguatula* of *Varanus monitor* in Senegal, the author concludes that, while the Linguatulidae are correctly placed as approximating to the Acarina, they form, in reality a special group.

MAPLESTONE (P. A.). **A Revision of the** *Amphistomata* **of Mammals.** —*Ann. Trop. Med. & Parasit.* 1923. July 12. Vol. 17. No. 2. pp. 113–212. With 4 plates and 32 text figs.

While it is impossible to make an extract of any value of a paper of this magnitude, it may perhaps be useful to abstract the author's introduction as indicating the reasons for undertaking the work.

The classification of STILES and GOLDBERGER (1910) was adversely criticized by BRAUN (1911), ODHNER (1911), and Looss (1912) on the ground that the then recent attempts to classify Trematodes by using

affinities in the lymphatic and excretory systems as a basis had been ignored. Reference is made to STUNKARD's (1917) provisional classification, and it is rejected as not improving matters. Looss's suggestion to classify the members of the group on the minute anatomy of the lymphatic excretory and copulatory systems is probably sound, but it appears to be too complicated for practical purposes.

The author's classification is based upon easily ascertained anatomical characters. It does not take cognizance of the standards required by the more advanced systematists, but it is claimed that the system is reasonably simple and consistent, and enables a species to be determined with considerable accuracy.

VEVERS (G. M.). **Observations on the Genus *Paragonimus* Braun with a Redescription of *P. compactus* (Cobbold, 1859) 1899.**—*Jl. Helminthology*. London. 1923. Mar. Vol. 1. No. 1. pp. 9–20. With 4 text figs.

The author has found lung flukes in five mammalian hosts dying in the Zoological Gardens during the last three years.

He has been able to confirm WARD and HIRSCH's view that the cuticular spines are recognizably different in the various species. Size and shape of the body, and the details of the internal organs have been found to be valueless for the purposes of recognition.

P. kellicotti, *P. ringeri*, and *P. westermanii* have been recognized, and on three occasions *P. compactus* has been found. It is emphasized that care must be taken to examine the spines from the same area always. The most convenient places are the area midway between the oral and ventral suckers, and the clear area between the testes.

The genus may be divided into two groups. In one (*P. ringeri* and *P. compactus*) the spines are arranged in clusters. In the other (*P. westermanii* and *P. kellicotti*) they are scattered singly.

The eggs of the four species differ from each other in point of size, but individual eggs of the same species vary also.

P. ringeri appears to be confined to China and Japan. In India *P. compactus*, *P. westermanii*, and *P. kellicotti* occur. So far as is known, *P. kellicotti* is the only species endemic on the American continent.

WALTON (C. L.). **Liver Rot of Sheep.**—*Jl. Ministry of Agriculture*. 1923. Aug. Vol. 30. No. 5. pp. 446–450.

The species of snail, *Limnaea truncatula*, *L. peregra*, and *L. palustris*, have been found in North Wales, but no incriminating evidence has as yet been found against the last of these.

Field experiments were made with sulphate of ammonia, which was reported by KHALIL to be fatal to the egg masses of *L. peregra* and *Planorbis corneus* in six hours in a dilution of 1 : 1,000. It was found to be of little value.

Copper sulphate, on the other hand, was found to be very effective but special care is necessary if it is used.

Several ditches which had been cleared of snails by means of copper sulphate 18–24 months previously were found to be free.

In another instance several large damp grass fields, which were swarming with *L. truncatula*, were ploughed and put under oats.

Only two specimens were found during subsequent examinations. The fields were again seeded down with oats and the resultant grass fields were practically clear of snails.

The value of ducks for keeping down the snail population was demonstrated in many cases.

JONES (S. B.). **Intestinal Bilharziasis in the West Indies : Intermediate Host.**—*Jl. Trop. Med. & Hyg.* 1923. Aug. 1. Vol. 26. No. 15. pp. 253–254.

The author has found that the probable intermediate host of the parasite in the West Indies is *Planorbis antiguensis*. The disease occurs in Guadeloupe, St. Martin, St. Kitts, Antigua (probably), San Domingo, and Porto Rico.

RAO (M. A. N.). **Observations on the Morphology and Life-Cycle of *Filaria recondita* Grassi.**—*Bull.* 144. *Agric. Res. Inst., Pusa* (*India*). 1923. pp. 1–7. With 2 plates & 1 chart.

During a period of six months the author has examined the blood of 299 dogs admitted as in-patients at the Madras Veterinary College, and has detected seven cases of microfilariasis.

The parasite measures 220–250 μ in dried films, and appears to be slightly longer while alive. The breadth is 4–5½ μ. At room temperature in hanging drop preparations nearly all the parasites are immobile after 24 hours. At body temperature death occurs sooner (16 hours), while in an ice-box parasites were found still active up to 48 hours.

Parasites are far more numerously present in the blood during the night then during the day; it is, in fact, scarcely possible to find them then. It is noted that if an infected dog be kept in the dark the peripheral blood may contain parasites in considerable numbers during the day. Blood obtained by pressure from different organs was examined, and the enumerations made appeared to indicate that they were most numerous in the lungs, the liver, kidneys, spleen, and glands following in order. In spite of this, however, the author found worms in larger numbers in sections from the liver than in those from the lungs. Post-mortem examinations were made in three cases, and the lesions were identical in all of them. There was general evidence of anaemia. The liver was enlarged, and showed whitish areas ranging in size from a mustard seed to a walnut. Microscopic examination showed areas of caseation surrounded by zones of fibroblasts. The spleen was enlarged. The kidneys showed parenchymatous degeneration, and slight interstitial proliferation with an infiltration of leucocytes. The sublumbar glands were as large as small oranges, and showed a few haemorrhages. These on section showed hyperplasia and caseation.

The active embryos in the blood were observed to attach themselves to the cover glass in moist preparations, and rapidly shoot out and withdraw a minute " spine " from the anterior end. They showed no sheath. In stained specimens the granules in the body are well seen. The anterior extremity is devoid of them, and there are three areas free of them in the body. The granules are larger and more closely packed than those seen in *Filaria bancrofti*, and they appear to be arranged spirally. FÜLLEBORN's vital staining showed that the stain diffused through the parasite at the V spot, suggesting that this forms a rudimentary excretory or water vascular system. Posteriorly the parasite tapers to a fine point.

A few specimens of Culex and Stegomyia, caught near the kennels, were dissected, and in the gut of more than 30 per cent. of the former microfilariae were found. Very few Stegomyia showed them, and then only in small numbers.

Both insects were bred and were used for experiments with infected dogs. As no specimens of Stegomyia were found to become infected they were discarded.

In experiments with Culex parasites resembling those found in the blood were detected in the mid-gut within three hours of feeding on an infected dog, but they appeared to be more sluggish. Eight hours after feeding the parasites appeared to be stouter, but showed no increase in length. The cutaneous covering appeared to be thicker. After 36–48 hours the worms had left the gut, and had migrated to the muscles of the thorax. After about a week 9 per cent. of the mosquitoes showed short, thick " larval " forms in the muscles of the thorax. At this stage the parasites could be observed to make sluggish movements, while the caudal prolongation occasionally made rapid movements to and fro.

On the 15th day one of six Culex dissected showed two larvae in the mouth. LEBREDO's method of subjecting the head of a live mosquito to pressure in salt solution showed that the larvae escaped from the labium and from near the base of the proboscis.

WARE (F.) & (M.). *Strongyloides stercoralis* **in a Dog.**—*Jl. Comp. Path. & Therap.*, 1923. June. Vol. 36. No. 2. pp. 104–108. With 3 text figs.

The authors record the occurrence of *Strongyloides stercoralis* in a dog for whose death it was certainly responsible. The subject was a black cocker spaniel bitch, about a year old. The interval elapsing between the onset of symptoms, the chief of which was diarrhoea, and death was about four months.

Larvae were first observed in the faeces ten days before death occurred, although careful examinations had been made weekly. Prior to this Ankylostome eggs had been detected in the faeces.

At the post-mortem examination the liver, spleen, and lungs were all congested and the heart dilated. The intestine showed two areas in which the wall was thickened. One of these was about 4 in. from the pylorus, and the other a few inches above the rectum. Between these thickened areas the wall was remarkably thin.

Smears made from any part of the wall showed great numbers of parthenogenetic Strongyloides females, rhabditiform larvae, and ova with contents in all stages from two cells to moving embryos. One Strongyloides female was found in the stomach.

Twelve specimens of *Ancylostoma caninum* were found in the intestine.

About six weeks before death occurred the animal showed symptoms of pneumonia, and although this may have been produced by the migration of the parasites, none could be found in sections of the lungs.

Sections of the jejunum showed that little or no damage had been done to the epithelium, and, contrary to what has been recorded by BLACKLOCK and ADLER in the chimpanzee, no parasites could be found in the substance of the gut wall. The thickening was mainly in the submucous coat.

The rhabditiform larvae in the faeces measured 0·355–0·44 mm. in length by ·02 mm. in thickness.

After 24 hours mature rhabditiform males and females, measuring 0·9 mm. and 1·35–1.45 mm. in length, respectively, were present in the cultures. These constitute the free-living stage of the parasite.

In a culture 38 hours old some rhabditiform larvae, the progeny of free-living adults, were found.

Ten hours later some of the second generation larvae had developed into the filariform infective stage.

By the fifth day all Strongyloides had disappeared from the culture.

For further morphological details the original paper must be consulted.

VAN SACEGHEM (R.). **La bronchite vermineuse des Bovidés au Ruanda.** [Verminous Bronchitis of Cattle in Ruanda.]—*Bull. Agric. Congo Belge.* 1923. Mar. Vol. 14. No. 1. pp. 50–56.

Parasitic bronchitis, due to *Dictyocaulus viviparus* and *Gordius viviparus* (*Strongylus micrurus*), is of frequent occurrence in Ruanda. It has occurred among the serum-makers belonging to the laboratory. These animals are grazed on grounds at 1,500–1,600 metres above sea-level. During the rainy season the fall is very heavy, and a not inconsiderable amount falls during the dry season. The temperature range is from 5° to 15° or 20° C. (shade temperature). Good pasturage is obtainable throughout the year.

In 1922 an outbreak of verminous bronchitis occurred and occasioned a mortality of 40 per cent. Young and adult animals were equally attacked. The author remarks that in every case in which a post-mortem was made there was marked gastro-enteritis.

The author describes the morphology and life-history of *Dictyocaulus viviparus*.

Intratracheal injections of turpentine, carbolic acid and creosote were useless. Transference of the animals to dry pastures was the only practical treatment. Animals should not be allowed out to graze until the dew has dried, moist herbage forming a vehicle for embryos. While larvae, according to the author's observation, are incapable of living in water, they thrive in the faeces of animals. These, therefore, should be spread thoroughly to ensure as rapid drying as possible.

RAILLIET (A.). **Les Strongles (anciens sclérostomes) et les strongyloses proprement dites.** [The Strongyles (formerly Sclerostomes) and the True Strongyloses.]—*Rec. Méd. Vét.* 1923. July. Vol. 99. No. 13. pp. 377–396.

This survey of the Strongyles and Strongyloses does not lend itself to abstraction, and should be consulted in the original by those interested.

GORDON (R. M.). **A Further Note on the Occurrence of Ancylostomes resembling** *Necator americanus* **amongst Domestic Pigs in Amazonas.**—*Ann. Trop. Med. & Parasit.* 1923. July 12. Vol. 17. No. 2. pp. 289–298. With 2 text figs.

In 1922 ACKERT and PAYNE described a hookworm from the gut of the domestic pig in Trinidad, and, though the parasite resembled *Necator americanus*, they came to the conclusion that the differences were of specific value. These authors based their opinion on the examination of ten anatomical features.

In the present paper the author takes these points seriatim and tabulates various measurements of Necators from the pig in Amazonas, the human host in Jamaica, and the human host in Amazonas, and arrives at the conclusion that no differences were found to be sufficiently constant to warrant the creation of a new species for the pig parasite.

DAUBNEY (R.). **The Kidney-Worm of Swine : A Short Re-Description of *Stephanurus dentatus* Diesing, 1839.**—*Jl. Comp. Path. & Therap.* 1923. June. Vol. 36. No. 2. pp. 97–103. With 5 text figs.

The author bases his description upon specimens from the Natural History Museum and from the collection of the Ministry of Agriculture.

Attention is drawn to the confusion that has arisen over certain morphological features of this species, and, as is indicated by the title of the paper, a redescription is given. The paper must be consulted in the original by those interested in the details.

GOODEY (T.) & CAMERON (T. W. M.). **Observations on the Morphology and Life-History of *Ascaris columnaris* Leidy, a Nematode Parasite of the Skunk.**—*Jl. Helminthology.* London. 1923. Mar. Vol. 1. No. 1. pp. 1–8. With 5 text figs.

The parasite described in this paper has been found in large numbers in skunks raised on a skunk farm in England. The male parasite was about 9 cm. in length by 2 mm. in breadth, the female 22·5 cm. by 3 mm. For anatomical details the original should be consulted.

Life-history.—Eggs were obtained by dissection of females and cultured in 2 per cent. formalin at 33° C. At this temperature a large number of the eggs became embryonated in a fortnight. At room temperature it required about a month. Embryonated eggs were placed under coverslips upon slides and subjected to pressure. This resulted in the liberation of the embryos. Each embryo was found to be provided with a delicate sheath, and the average measurements were ·34 mm. by ·02 mm. Mice were fed with embryonated eggs, and on the fourth day they were found to be ill. Examination showed that embryos were present in the lungs and liver—more numerously in the former.

METALNIKOW (S.). **Les quatre Phagocytes d'*Ascaris megalocephala* et leur rôle dans l'immunité.** [The Four Phagocytes of *Ascaris megalocephala*, and their Rôle in Immunity.]—*Ann. Inst. Pasteur.* 1923. July. Vol. 37. No. 7. pp. 680–685. With 4 text figs.

In the course of his investigations regarding immunity in invertebrates the author has made use of *Ascaris megalocephala*, which can be kept alive for about 48 hours in salt solution containing white of egg at 37–40° C.

If a small quantity of powdered carmine or indian ink is introduced into the body cavity of the worm, within a few hours the particles are found to be collected in curious star-shaped structures, of which there are four in the coelom. These bodies are fixed by very slender filaments on the one hand to the exterior of the intestine, and, on the other, to the inner surface of the body wall.

Each phagocyte is an enormous cell, measuring from 1·5–2·5 millimetres in diameter, and possesses a nucleus sufficiently large to be visible to the naked eye.

Each of these structures comprises a cell with branching outgrowths. The nucleus contains a number of chromatic granules, and the cytoplasm surrounding it stains more intensely than the peripheral part. In some cases one can make out striae or fibrillae continuous with the axes of the outgrowths.

These outgrowths carry little rounded bud-like processes, measuring 2–12 μ in diameter, and when stained with methylene blue or Giemsa, each is found to contain a nucleus-like structure, which is in direct connexion with the axis of the process. The author considers that the axes of the processes and the striae in the main cell body represent a skeletal structure which is essential in so large a cell. The bud-like processes on the branches are analogous to the phagocytes of the higher animals, as has been shown by the injection of bacteria of various kinds into the body cavity of the worms. The bacteria are found to be enclosed in the globular projections within a few hours, and later may be quite unrecognizable as a result of their digestion. Living tubercle bacilli did not appear to be digested.

The blood of *Ascaris megalocephala* has been found to be without visible action on bacteria in vitro.

HESSE (A. J.). **On the Free-Living Larval Stages of the Nematode *Bunostomum trigonocephalum* (Rud.) a Parasite of Sheep.**—*Jl. Helminthology*. 1923. Mar. Vol. 1. No. 1. pp. 21–28. With 3 text figs.

Eggs were obtained by opening the uterus, and they were cultured in a suspension of faeces from the large intestine of the sheep.

At room temperature hatching required 48 hours to five days, depending upon the temperature. With incubation at 22° C. hatching took place in 24 hours.

The eggs measure ·085 mm. by ·05 mm. They are usually slightly flattened on one side, and the shell is thickened at one pole. Eggs in the terminal part of the uterus are in the 8 or 16-cell stage, but those in which the contents have only divided once develop in culture.

The larvae escape by breaking the shell to one side of one pole. They measure about ·5 mm. in length by ·02 to ·035 mm. in breadth. The oral aperature has six processes round it. There is a short buccal capsule. The oesophagus is usually flexed, its nuclei are visible, and it shows transverse striation. The chyle intestine shows eight dorsal and eight ventral cells bounding a lumen.

The elements of a nervous system are recognizable.

After 24 hours at 22° C. the larva becomes quiescent, the cuticle becomes loosened, and the new article of the second stage larva is formed.

At this stage the parasite is only slightly longer than in the preceding phase and is not broader.

After a period of 24 hours the second moult occurs. The old cuticle is not cast, but remains closely adherent to the larva. In this phase the parasite does not feed, and for its further development must gain access to a sheep. It possesses remarkable powers of resistance. It can retain its vitality for "some time" in formalin (strength not stated), a mixture of ether and alcohol, and concentrated solutions of pancreatin. It can withstand desiccation for an indefinite time.

Specimens have been kept alive in stagnant water for over a month, the only visible change being the disappearance of granules from the intestinal cells.

Experiments appeared to indicate that the parasite does not migrate up the blades of grass as does *H. contortus*.

FREEBORN (S. B.). **The Control of Suckered Round Worms of Poultry.** —*Cornell Vet.* 1923. July. Vol. 13. No. 3. pp. 223–231.

The author's conclusions are as follows :—

Tobacco dust, containing 1·5–2 per cent. nicotine, mixed in the proportion of 2 per cent. of the dry mash and fed for one to four weeks, expels practically all the intestinal worms and about 80 per cent. of the caecum worms. Tobacco infusions are not recommended for the round worm, for, although they are effective, they are toxic, difficult to administer, and have little effect on the caecum worms. Chenopodium, derrid ("derrisene"), and carbon tetrachloride were unsatisfactory for the removal of these worms. Nicotine has apparently little effect upon the common tape worm of poultry, *Choastaenia infundibuliformis* Goeze.

BOULENGER (C. L.). **A Collection of Nematode Parasites from Zanzibar.**—*Parasitology.* 1923. June. Vol. 15. No. 2. pp. 113–121. With 5 text figs.

Sixteen species have been identified, the majority being well-known round worms. Reference is made to these only for the purpose of indicating distribution.

Heterakis dahomensis from the African rat, *Ascaridia lineata* from the stomach of a chicken, *Subulura otolicni* from the ca cum of *Galago garnetti*, and *Physaloptera praeputialis* from the cat and leopard, are described at some length.

VEVERS (G. M.). **New and Little Known Helminths from British Guiana.**—*Jl. Helminthology.* London. 1923. Mar. Vol. 1. No. 1. pp. 35–45. With 3 text figs.

While in British Guiana the author found 11 species of entozoa in birds and mammals. Three species were new and one was placed in a new genus *Trypanoxyuris*.

The new species were as follows :—

Contracaecum andersoni.—Small intestine. Little blue heron.

Trypanoxyuris trypanuris.—Caecum. *Pithecia monachus* (Humboldt's saki).

Raillietina (*Skrjabinia*) *bodkini.*—Small intestine. Spotted sandpiper.

SHEATHER (A. Leslie). **The Detection of Worm Eggs in the Faeces of Animals, and Some Experiments in the Treatment of Parasitic Gastritis in Cattle.**—*Jl. Comp. Path. & Therap.* 1923. June. Vol. 36. No. 2. pp. 71–90. With 1 text fig.

After a number of experiments the following technique was fixed upon as yielding the most constant results with the least expenditure of time and with the simplest apparatus.

The faeces are diluted with water until they are quite liquid and are passed through a wire screen having 30 meshes to the lin ar inch. The filtered liquid is mixed with an equal volume of a solution of sugar

made by dissolving one pound of sugar in three-quarters of a pint of water (with the aid of heat). The mixture is centrifuged for two minutes at about 2,000 revolutions per minute. By the end of this time the eggs (except those of the liver fluke) have risen to the top of the liquid. To collect the eggs a piece of plasticine, which is shaped into a blunt point bent at a right angle and attached to a wooden handle, is pressed on to the centre of the surface of a cover-glass of such size that it will just enter the mouth of the centrifuge tube. By this means the cover-glass is lifted and lowered on to the surface of the liquid so that it is in contact throughout its extent. It is then raised again with a slight tilt, to reduce the quantity of liquid lifted by it, and dropped off the plasticine on to a slide.

The experiments in the treatment of parasitic gastritis were carried out on ten yearlings which were the hosts of *Ostertagia ostertagi.* Turpentine, copper sulphate, a mixture of copper sulphate and sodium arsenite, tartar emetic and carbon tetrachloride were tried, but without any success.

Carbon tetrachloride appeared to be a dangerous drug for cattle; a dose of 25 cc. was probably responsible for the death of an animal treated with it.

CAWSTON (F. G.). **Possible Hosts for the Bilharzias in Portuguese East Africa.**—*Jl. Trop. Med. & Hyg.* 1923. July 2. Vol. 26. No. 13. pp. 228–229.

BACTERIAL DISEASES.

VELU & JALABERT (H.). **Essais de diagnostic de la fièvre de Malte chez la chèvre par les reactions allergiques.** [The Diagnosis of Undulant Fever in Goats by Allergic Reactions.]—*Rec. Méd. Vét.* 1923. July 30. Vol. 99. No. 14. pp. 311–321.

The author points out that from a clinical point of view the diagnosis of undulant fever in goats is beset with difficulties for the reasons that many infected animals present no symptoms, and that symptoms such as abortion, mastitis, orchitis, etc., are neither constant nor specific.

Laboratory tests have not yielded a certain method of diagnosis. Irregularities of an obscure nature have been encountered by a number of investigators in applying the agglutination test.

The author has used a filtered broth culture for diagnostic purposes. Cultures were grown in peptone broth for 20 days, heated to 62° C. for half an hour, filtered through a Chamberland filter and preserved by the addition of 0·5 per cent. phenol.

The author gives the details of a number of tests in which the filtrate was injected intradermally and subcutaneously. For the former the dose ranged from 0·25–1·0 cc., and for the intradermal test 0·1–0·2 cc. were used. Agglutination tests were carried out for comparison.

In the first test the lower eyelid was used for the intradermal injections, but the thickness of the skin rendered the reading of the results difficult, more especially as the reactions obtained were very slight. Subsequently the anal folds were used, as in the case of the tuberculin test.

The author describes the characters of the swelling of the fold in a positive reaction, and these appear to resemble those obtained in the case of tuberculin tests, but he gives no indication as to the time elapsing between the injection and the appearance of the reaction, nor of its duration.

Subcutaneous injections of 1 cc. on the side of the chest, in the anal fold, or into the lower eyelid have not produced any thermal or general reaction of any kind.

With regard to the concordance with the results obtained in the agglutination tests the authors' statements are as follows :—

1. When the first intradermal reaction has given a negative result the agglutination test has in no case been positive.
2. In fresh animals when the agglutination test has been positive the first intradermal test has yielded a positive result.
3. Positive agglutination tests have not been obtained in all cases in which the first intradermal test has been positive.

Comparisons of the results obtained in a succession of tests in herds appear to indicate that when tests are repeated the results are likely to be discordant. The lapse of a month between tests does not appear to be a sufficiently long interval to permit of the obtaining of concordant results.

CÉSARI (E.). **La prophylaxie vétérinaire de la fièvre méditerranéenne.** [The Prevention of Undulant Fever from the Veterinary Point of View.]—*Rec. Méd. Vét.* 1923. Aug. 30. Vol. 99. No. 16. pp. 327–359.

In the first few pages of this paper the author deals briefly with the symptoms of the disease in man, its history and geographical distribution. The difficulty of intervening for the purpose of preventing the spread of the disease in countries lightly infected, or of preventing its introduction into those which are, so far as is known, free, lies in incomplete knowledge of all the factors concerned. He states that existing knowledge is not sufficient to permit of a rational attack on the disease, as it occurs in goats.

Reliance has been placed upon the agglutination test for diagnosis, but it is pointed out that recent observations have shown that this is not specific, since parallel results are obtained when the abortion bacillus is used, and that even apart from this there appears to be no agreed standard as to what indicates a positive result.

Animal experimentation with small animals is not sufficient to effect a differentiation between the two organisms.

The author suggests that it is not an improbable supposition that Bang's bacillus may have become changed into Bruce's organism as a result of some external factor acting upon it.

Among a mass of details, regarding which there is no degree of certainty, one fact stands out as established, namely, that under natural conditions undulant fever in man is almost invariably associated with contamination from an animal source.

In spite of the most scrupulous care, cultures of the *Micrococcus melitensis* are extremely dangerous to handle, and large numbers of cases of infection have arisen in laboratories as a result. The course of these cases is exactly like that of the disease contracted naturally, so to speak, but such infections never become centres for the spread of the disease to other persons in contact. Transmission from man to man does not in all probability occur.

The author summarizes at some length the published evidence regarding the part played by goats' milk in the epidemiology of undulant fever. Ingestion of contaminated milk cannot be incriminated in all cases, and a summary is given of articles published upon the transmission of the disease by other means. It is pointed out that cases have been recorded in which the individuals affected have come into close contact with animals by reason of their calling, and such cases have been observed, particularly in butchers. In these, inoculation suggests itself as the method of infection. For this reason the boiling of milk cannot be looked upon as an infallible means of preventing the disease among human beings.

Reference is made to the records of positive results having been obtained in agglutination tests in which mule serum has been used, and to the far less pronouncedly positive reactions obtained by some authors using horse serum.

The occurrence of the infection in sheep appears to be definitely established.

The serum of normal dogs may cause agglutination up to 1 : 600 according to VALLET & RIMBAUD, but KENNEDY has reported the isolation of the micrococcus from the mesenteric glands of a dog, one out of nine giving positive agglutinations. Similarly, SHAW obtained the organism from the mesenteric gland of a cat.

Rabbits and guinea-pigs appear to be capable of contracting the infection under natural conditions.

But there can be no doubt that in spite of these positive results the goat is the natural reservoir of the virus.

Two main lines of action are indicated for the control of the disease among goats. These are sanitary police regulations and immunization.

The *Micrococcus melitensis* does not, as a general rule, provoke the formation of any lesions in infected goats, but it appears to be a fact that complete recovery from infection is not known to occur. The organism is, according to experimental data, capable of maintaining its existence in the outer world under favourable conditions for periods amounting to weeks.

Since the urine is the principal source of contamination in the outer world, it appears to be improbable that any sanitary police regulations could be devised which would be effective for the control of the disease.

With regard to the recognition of the existence of the disease in herds of goats, it is pointed out that there is no constant symptom. Abortion has been noted on a number of occasions, but this is not invariable. It is, in fact, stated that in Malta, Tunis, and Algeria, where the disease is most widely spread, abortion seldom occurs, but the explanation of this possibly is that, as in the case of bovine abortion, this mishap usually occurs shortly after infection only. It is only when a large number of abortions occur in a herd or in a country that attention is called to its occurrence. Such accidents may be due, in reality, to *B. abortus*, but if that is so there is no criterion by which differentiation can be established.

Up to the present no method of vaccinating goats against melitococcus infection has been devised. It is not possible to apply the method used for contagious abortion of cattle. The process there is not, in reality, one of vaccination, but of infection. Animals inoculated with living culture continue to harbour the infection, although abortion does not occur.

The author suggests that it might be possible to protect goats against the micrococcus by inoculating them with Bang's bacillus. This harmless agent might possibly prevent the multiplication of the micrococcus, but it is also suggested that passage through the goat might exalt its virulence for man, and thus identify it with the micrococcus.

The author sums up his review by formulating the following prophylactic measures :—

All goats' milk should be boiled before it is drunk. That used for making cheese in infected areas should be pasteurized.

Herds of milking goats should be under sanitary surveillance in infected areas.

The importation of goats into France from countries known to be infected should be forbidden.

YAKIMOFF (W. L.). **La fièvre ondulante au Turkestan russe.** [Undulant Fever in Russian Turkestan.]—*Bull. Soc. Path. Exot.* 1923. Apr. 11. Vol. 16. No. 4. p. 227.

During 1913 the author tested the serum of six goats with a strain of *M. melitensis* received from Tunis. One of them gave a positive result to the agglutination test.

VALLÉE (H.). **Sur l'inoculation intra-cutanée de la Bactéridie charbonneuse.** [Intracutaneous Inoculation with the Anthrax Bacillus.] —*Rec. Méd. Vét.* 1923. July 30. Vol. 99. No. 14. pp. 285–288.

Having referred to BESREDKA's discovery regarding the insusceptibility of the guinea-pig to anthrax by inoculation in any way other than by the intracutaneous path, the author points to the necessity of ascertaining, if possible, whether this possibly applies to other animals and to other infections. The difficulty of infecting cattle by subcutaneous inoculation is well known.

Vallée had at his disposal five heifers, which had become unfit either for experimental work or for the butcher. These were inoculated intradermally in the caudal fold with 0·1 cc. of a 24-hours' broth culture of the anthrax bacillus just isolated. The following reactions were observed : From the 18th hour the folds showed soft, painless swellings without any indication of inflammation. At about the 24th hour the swelling increased, and became red and painful. At this stage it ranged in size from a plum to an apricot. Between the 36th and 48th hours the animals' temperatures rose to nearly 42° C., and remained high, while the lesions developed characters closely resembling those of malignant pustule in man. This continued for three or four days. In the case of three animals the symptoms gradually subsided and the animals recovered, but they had lost condition to a marked extent. The other two animals died of typical anthrax 48 and 65 hours after inoculation. When the minute dose used in these experiments is taken into consideration, as compared with the sometimes immense doses which have been used in earlier cases in order to obtain infection by the subcutaneous route, the only conclusion that can be arrived at is that the ox is as susceptible to intracutaneous inoculation as is the guinea-pig.

The history of experimental pathology is full of parallel cases : pleuropneumonia, rabies, sheep-pox, blackquarter, foot-and-mouth disease. In connexion with the last of these the author has frequently

found that large doses of virulent blood serum, which are non-pathogenic by the intravenous and subcutaneous paths, are infective by intradermal inoculation.

Similarly, certain bacterial products and toxins sometimes produce severe reactions when minimal does are injected intradermally, while the same doses injected in other ways are inactive (mallein, tuberculin, diphtheria toxin, etc.).

That guinea-pigs which have failed to become infected with anthrax when inoculated in some way other than by the intradermal path do not acquire any immunity is not a matter for surprise, since analogous observations have been made in connexion with pleuropneumonia and foot-and-mouth disease.

These facts have an important bearing upon the subject of vaccination. It is now a simple matter to vaccinate guinea-pigs against anthrax by intracutaneous inoculation. It was formerly held to be impossible to confer such protection.

Further investigation is essential. It must be ascertained whether the most favourable path for infection is also the most favourable for immunization.

DOYLE (T. M.). **The Value of Attenuated Cultures for the Immunisation of Bovines against Haemorrhagic Septicaemia.**— *Jl. Comp. Path. & Therap.* 1923. June. Vol. 36. No. 2. pp. 109–118.

The author has carried out experiments upon lines suggested by the paper by D'HERELLE and LE LOUET in the *Annales de l'Institut Pasteur* for November 1921 [see this *Bulletin*, Vol. 10, No. 2, May, 1922, p. 42]. These authors found that passage of the organism through a series of rabbits, followed by cultivation in a broth made from rabbit meat produced a safe and reliable vaccine.

Doyle's strain was obtained from Muktesar, where it has been repeatedly passed through rabbits, and he therefore did not think it necessary to pass it through rabbits again before sowing it out in rabbit broth.

As Cyprus cattle are employed for the serum production in Egypt, and as these are costly, it was decided in the first instance to use the rabbit broth cultures on animals already immunized by double inoculation, that is to say, to use it for the first hyperimmunization dose.

Three animals were used. One died and one had a severe reaction. It appeared that the virulence of the organism had become exalted in the rabbit broth. The author does not refer to any tests in which the virulence of the culture was ascertained prior to the cultivation in rabbit broth.

In the next experiment the culture was first passed in series through eight rabbits. Cultures were made in rabbit broth from the last of these and incubated for 15 days at 37° C.

A dose of 0·5 cc. proved fatal to a Cyprus bull in 84 hours.

Experiments were carried out with the object of ascertaining the effects of incubation for varying periods, and of comparing the virulence of cultures in beef and rabbit broth.

Guinea-pigs were used, and the seed material was from the eighth rabbit of the series previously referred to.

The beef and rabbit broth flasks were divided into two lots. One batch was capped with rubber caps and the other left uncapped.

It was found that in every case the cultures in the capped flasks retained their virulence for periods up to 28 days, but that the cultures in rabbit broth were more rapidly fatal than those in beef broth.

The virulence of the cultures in the uncapped flasks rapidly declined, for after 14 days' incubation they failed to produce a fatal result, but conferred immunity.

The author reviews some of the literature referring to this disease, and considering the results obtained in comparison with his own, concludes that the virulence of the bacillus of haemorrhagic septicaemia varies greatly in different places.

TEPPAZ (L.). **La tuberculose bovine à l'abattoir de Dakar. (2e Note.)** [Bovine Tuberculosis at the Dakar Abattoir.]—*Bull. Soc. Path. Exot.* 1923. May 9. Vol. 16. No. 5. pp. 381–383.

The case here described is the fourth case of tuberculosis found in an animal slaughtered at Dakar. The animal was a zebu, 12 years old. The lungs were filled with lesions ranging in size from a millet seed to a nut. All the thoracic glands were involved, but the pleura and abdominal organs appeared to be free from lesions.

A guinea-pig and a rabbit were inoculated subcutaneously with a thick suspension from one of the tubercles.

The guinea-pig died on the 26th day. The lesions were as follows : An ulcer at the seat of inoculation, two caseous sublumbar glands, and about a dozen small abscesses in the liver. All the internal organs were congested. The guinea-pig is said to have died from acute septicaemic tuberculosis.

The rabbit showed neither local nor general symptoms of infection at the end of the fourth week, and is therefore considered to have failed to become infected. It does not appear to have been killed and examined post-mortem.

These results are contradictory as compared with those previously obtained, and upon the available facts it is difficult to form an opinion as to the type of bacillus found in the zebus.

VAN SACEGHEM (René). **Pleuropneumonie des Bovidés, due à un nouveau bacille.** [Bovine Pleuropneumonia due to a New Bacillus.]—*Bull. Agric. Congo Belge.* 1923. June–Sept. Vol. 14. Nos. 2–3. pp. 396–399.

The author claims to have discovered the causal organism of a type of pleuropneumonia in cattle which has not been described hitherto. The disease which occurs in peracute, subacute, and chronic forms attacks cattle only under natural conditions, but is transmissible to the sheep, goat, and rabbit experimentally. The pig and dog are resistant. It is said to occur enzootically, and sometimes as an epizootic in Ruanda. In the peracute form there is high fever, disturbance of respiration, in some cases abundant salivation, lachrymation and swelling of the eyelids. Death takes place in a few days. At the post-mortem there may be found single, double, or only localized pleurisy. There is an amber-coloured sero-fibrinous exudate. The pneumonic lobes vary in colour, and the interlobular septa are thickened, producing a mosaic-like appearance.

In the subacute cases the lesions are less extensive, and there may be found only a number of fibrous tubercles about the size of filbert

nuts, which have a centre composed of brownish pulp-like material. There is sometimes cirrhosis of the liver.

The causal organism is discoverable in the lung lesions and in the blood in fatal cases. It is a very small gram-negative cocco-bacillus. It grows poorly on plain agar, but well on agar to which gum arabic has been added in the proportion of 10 grammes for every 500 grammes of meat used. A more exact statement cannot be made, as the amount of water used in making the agar is not given. The bacillus does not liquefy gelatin, nor coagulate milk. Litmus is not turned red. Liebig broth is at first rendered turbid, but later clears up. On potato a thin layer of growth develops.

Intravenous inoculation of a calf, goat and sheep with a culture, resulted in death in each case. The calf and goat died within 12 hours and the sheep after three days. At the post-mortem pneumonia and pleurisy with effusion were found. The bacillus was recovered from the blood. Cultures are fatal to rabbits in 12 hours.

Young cattle appear to be more susceptible than adults to experimental infection, but this may be due to acquired immunity. This type of pleuropneumonia appears to be a frequent complication of rinderpest, and the author has observed several cases of the disease following transfusions of blood in the course of the preparation of antirinderpest serum.

FUTAMURA (H.). **Studies on Bovine Influenza (Second Report).**—*Jl. Japan Soc. Vet. Sci.* 1923. June. Vol. 2. No. 2. [Author's English Abstract. pp. 200–202.]

The author describes an outbreak of the disease known as bovine influenza among the cows and calves in a dairy herd. Twenty-three cows and 14 calves were attacked within a month. Treatment, including the use of hyperimmune serum, was resorted to, and all the cows recovered. The disease continued to spread among the calves until 22 had become infected. Of these 13 died.

Post-mortem examinations were made of seven chronic cases and one acute one.

In the chronic cases hepatization of the lungs with multiple abscess formation was constant. The intestines showed pronounced congestion, and the liver and kidneys were enlarged.

In the acute case the lesions were haemorrhagic enteritis, subcutaneous oedema, enlargement of the liver, spleen, and kidneys, and oedema of the lungs.

Bipolar bacilli were obtained in some cases in pure culture from infected organs, and in other cases from mice experimentally infected with emulsions of them.

The author does not make it quite clear to what extent serum was used in the treatment of these cases. At the beginning of the abstract it is said that ordinary treatment, combined with serum, was not effective in the case of calves, and one is led to think that all the diseased calves were treated. Subsequently it is stated that only 11 calves were treated with serum and that all recovered. This is qualified by the statement that three had relapses and died. The dose of serum used was 50 cc., and this was repeated two or three times.

The author draws attention to the resemblance of this disease to the pleuropneumonia of calves in other countries.

TRAUM (J.). **Lymphangitis in Cattle caused by an Acid-fast Organism.** —*Cornell Vet.* 1923. July. Vol. 13. No. 3. pp. 240–245.

In this paper the author continues his observations regarding cases of lymphangitis in cattle caused by an acid-alcohol fast organism. He has previously placed on record 12 such cases, 6 in 1916 and 6 in 1919 [see this *Bulletin*, 1919, Dec., Vol. 7, No. 4, p. 285, ref. only].

The lesions of the disease are subcutaneous nodules ranging in size from a bean to a goose egg along the course of lymphatic vessels, usually on a limb, but occasionally elsewhere. In some cases a number of the nodules form a large cluster. The nodules vary in density to the touch, but on section are always found to have necrotic centres which are generally becoming liquid.

In a few cases the organisms were plentiful, but are usually scarce. They ranged from 2–3·5 μ in length, were straight or curved, and presented a beaded appearance in some cases. Occasionally smears showed a scattering of organisms which had taken the counterstain.

Large numbers of guinea-pigs, rabbits, some chickens, mice, calves and swine developed no lesions of diagnostic value after inoculation. In occasional cases rabbits and guinea-pigs developed local lesions at the seat of inoculation, but these disappeared within three weeks. Acid-fast bacilli were sometimes found in these. It is estimated that not less than 50 per cent. of cattle showing these lesions would react to tuberculin (estimate based on a small number of cases). About 25 animals showing the subcutaneous nodules have been examined post-mortem, but in no case has the simultaneous existence of tuberculosis been detected.

The author states that all kinds of media were used in attempting to cultivate the organism, but in most cases they remained sterile. In one tube of cooked blood agar a growth was obtained, but since this on subculture grew readily on a number of ordinary media, it appears doubtful whether it was the causal organism of the lesions.

Guinea-pigs, rabbits and calves inoculated with it developed local purulent lesions, but acid-fast bacilli were not discoverable in the pus.

TRAUM (J.). **Lymphangitis of Cattle caused by the Preisz-Nocard Bacillus.**—*Cornell Vet.* 1923. July. Vol. 13. No. 3. pp. 246–249.

The author reports two cases of lymphangitis in cattle from which he was able to isolate typical Preisz-Nocard bacilli. His findings are in agreement with those of other investigators.

MAZZUCHI (M.). **Contributo allo Studio dell' azione patogena del bacillo del carbonchio ematico.** [The Pathogenic Effects of the *Bacillus anthracis*.]—*Clinica Veterinaria.* 1923. July–Aug. Vol. 46. No. 7–8. pp. 421–435.

DISEASES DUE TO FILTERABLE VIRUSES.

ONO (S.) & KONDO (S.). **Studies on Rinderpest in the Deer** (*Cervus sika*) **and Changes in the Blood of Infected Animals.**—*Jl. Japan. Soc. Vet. Sci.* 1923. June. Vol. 2. No. 2. [Authors' English Summary, pp. 158–161.]

Cervus sika is susceptible to rinderpest. The period of incubation in cases of natural infection does not exceed 10 days, and after experimental infection it is 3–6 days. Serum was found to be curative when administered at the onset of fever, and repeated four days later. For this purpose doses of 50 cc. were used.

The virus disappears from the circulation within six days of recovery. The plasma became progressively more yellow in colour as the temperature rose, owing to the presence of bile in it. The percentage of haemoglobin decreased, but the red corpuscles became less fragile when tested with salt solution. There was a simultaneous decrease in the number of red corpuscles, but this tended to rise again towards the end.

Leucocytes increased in numbers between infection and the rise of temperature. The number fell during the febrile period, but increased as the temperature fell.

VAN SACEGHEM (R.). **La peau, voie de penetration pour le virus de la peste bovine.** [The Skin as a Port of Entry for the Virus of Rinderpest.]—*Bull. Agric. Congo Belge.* 1923. Mar. Vol. 14. No. 1. pp. 56–57.

In some earlier experiments, in which the author attempted to infect animals with rinderpest by rubbing defibrinated virulent blood into scarifications on the skin, only negative results were obtained. It occurred to him that this might be due to the destructive action of the sun upon the virus.

An animal was scarified lightly on the thigh, and an emulsion of buccal crusts ground up in salt solution was applied. The animal was kept indoors throughout the experiment. Infection resulted, the temperature rising on the third day. Death occurred on the tenth day.

The scarifications showed a local lesion resembling those found on the gums in naturally infected cases.

VAN SACEGHEM (R.). **Essais de vaccination contre la peste bovine avec du sang pesteux chauffé.** [Vaccinations against Rinderpest with Heated Virus.]—*Bull. Agric. Congo Belge.* 1923. Mar. Vol. 14. No. 1. pp. 47–49.

The author gives the results of injecting 1 cc. of rinderpest blood, heated in two cases to 55° C. for 15 minutes, in two to 58°–60° for 30 minutes, and in two cases 1 and 5 cc. of blood heated to 60° C. for an hour. Three out of the first four died. One showed a rise of temperature and recovered. The two which were inoculated with the blood heated for an hour at 60° C. failed to become infected.

BALOZET. **Etude clinique et expérimentale de l'anémie infectieuse des Equidés au Maroc.** [Clinical and Experimental Investigation of Pernicious Anaemia of Equines in Morocco.]—*Bull. Soc. Path. Exot.* 1923. July 11. Vol. 16. No. 7. pp. 525–533.

In 1921 the author, in collaboration with VELU, published an account of an equine disease observed in Morocco, the nature of which they were

not able to state with certainty. The investigations undertaken subsequently enable Balozet to state that the disease is identical with the typhoanaemia of CARRÉ and VALLÉE and with the so-called swamp fever of American and other authors.

The disease occurs naturally in the horse, ass and mule. It has a seasonal distribution, and is characterized by febrile attacks at irregular intervals. The temperature curves are picturesquely described as being "steeple-like." Petechiae on the visible mucous membranes is a marked symptom in the horse. These are seldom or never observed in the ass and mule. Cases occur during the period May–October.

Young animals are susceptible to infection, the author having seen a case in a foal three months old.

The disease invariably runs a chronic course, although in the early stages there may be very severe temperature reactions. After this first period affected animals become dull and listless, and lose considerably in condition. The temperature is irregular. There may be elevations which persist for a day or two, and at other times there may be a difference of three degrees between the morning and evening temperature for several days on end. This phase may last for a long time.

It has been observed on a number of occasions by army veterinary officers that the disease attacks horses in the irregular forces with far greater frequency than those belonging to the regular army. Better management and feeding have been held to account for this. It has also been suggested that, as there is a probability that the disease is insect transmitted, the regular army horses are less exposed to the bites of flies than are those of the auxiliaries, since the latter turn their horses loose to graze far more commonly.

Mere contact does not lead to transmission of the disease. This has been proved by experiment on a number of occasions, and when a number of cases occur in a unit these are never (or save only by chance) animals standing next to each other.

The mortality is low, but on service it may be higher on account of overwork.

Details of experiments are given, and these furnish evidence that in the first place the disease is transmissible by inoculation with whole blood, and secondly that filtration does not hold back the virus. Contrary to what the Japanese, German, and South African investigators found, the author was not able to transmit the infection to pigs. But only a single experiment was carried out, and it is noted that it should be repeated.

According to BASSET, a definite diagnosis can be based upon the production of a rise of temperature at will by the intravenous injection of 100 cc. of normal horse serum, or a subcutaneous injection of a concentrated solution of sodium chloride or potassium iodide. The explanation of this action is that the blood is in a condition of unstable equilibrium which is readily disturbed by these means. The author has carried out experiments upon these lines, but has failed to provoke a reaction.

Blood counts have shown that there is a direct relationship between the severity of the disease and the number of red corpuscles, and it would appear that the number of corpuscles drops after a febrile attack. The leucocyte count varies within normal limits. But there is a marked proportional increase in the number of polynuclears during the crises.

Auto-agglutination of the corpuscles has been observed.

The paper contains an extensive bibliography.

BIGOT. **L'anémie pernicieuse du cheval au Maroc. Persistance du virus chez les animaux guéris.** [Equine Pernicious Anaemia in Morocco. Persistence of the Virus in Recovered Animals.]—*Bull. Soc. Path. Exot.* 1923. May 9. Vol. 16. No. 5. pp. 300–303. With 2 figs.

Blood was taken from two animals which had made apparently complete recoveries from natural infections some months before, and injected in doses of 200 cc. into two fresh animals. Both showed an elevation of temperature on the day of inoculation, and subsequently, on the 17th and 23rd days respectively, showed sudden elevations of temperature to 40° C. and 41° C. Apart from this and a very faint yellowish tinge of the mucous membranes, which would have escaped observation unless very carefully looked for, the animals showed no disturbance of health.

It was therefore found that recovered animals harbour the virus long after apparent recovery. The following facts also emerged from the experiment.

The period of incubation is longer than when blood from animals actually ill is used for inoculation. These were 17 and 23 days, as compared with 9–16 days. Infection in the cases recorded here would have escaped detection but for the daily use of the thermometer. The blood of recovered animals, therefore, produces a milder infection.

It is proposed to test these animals later with blood from an animal actually affected with pernicious anaemia.

NAGAO (M.). **Über die Widerstandsfähigkeit des Virus der infektiösen Blutarmut des Pferdes und der Rekurrensspirochäten gegen die Kälte.** [The Resistance of the Virus of Equine Infectious Anaemia and of the Spirochaete of Relapsing Fever to Cold.]—*Jl. Japan. Soc. Vet. Sci.* 1923. June. Vol. 2. No. 2. pp. 127–131.

The author mixed the virulent blood from a case of equine infectious anaemia with 0·9 per cent. salt solution containing 1·5 per cent. sodium citrate in the proportion of 3 to 1. This was kept in an ice-chest at 0° to 2° C.

It was tested after six months, one year, and two years. It is said that the virus was found to be virulent after two years, but that this was so does not appear to be clear from the test. A positive result was obtained with one of two horses inoculated with virus which had been kept for a year.

Spirochaeta duttoni was found to retain its virulence up to 105 days in an ice-chest, but only up to seven days in an incubator at 37° C. The parasite was kept in citrated blood.

FRÖHNER (E.) & BIERBAUM (K.). **Ueber Resistenz des Virus der ansteckenden Anaemie der Pferde gegen Karbolsäure.** [The Resistance of the Virus of Equine Contagious Anaemia to Carbolic Acid.]—*Berlin. Tierärzt. Woch.* 1923. May 31. Vol. 39. No. 22. pp. 243–245.

The importance of this question lies in the possibility of the virus occurring in protective sera derived from horses for use in equine diseases. A second point is that according to Japanese investigators the pig is susceptible to the infection, and this might also lead to a dissemination of the virus in protective sera prepared from swine.

A small number of tests have been carried out with a view to testing the resistance of the virus to carbolic acid. Expense prevented the question from being dealt with in a comprehensive manner. The authors have therefore had to content themselves with ascertaining the period required for a definite concentration of carbolic acid to prove fatal to the virus. The results of the experiments showed that it required a period of three months to ensure the destruction of the virus in serum by means of carbolic acid in a concentration of 0·5 per cent.

OHAHI (M.). **On the Changes in the Blood and the Distribution of the Virus in Rabid Animals.**—*Jl. Japan Soc. Vet. Sci.* 1923. June. Vol. 2. No. 2. pp. 203-209.

The author has examined the blood of rabbits and dogs inoculated with the fixed virus of rabies.

In a tabular statement the counts of the total number of leucocytes present in the blood of 14 rabbits before and after infection are given. The period of incubation is given as four to five days, and the course of the disease 2–4 days.

In most cases it is seen that the number decreased between inoculation and the appearance of symptoms, but that subsequently there was a more or less steady increase. In about 30 per cent. of animals there was a decrease just before death.

The figures given for the leucocyte counts of two dogs show that similar changes were observed in these.

The author also gives tabular statements of the differential counts of leucocytes in rabbits (average for 14) and in dogs (average for four).

The lymphocytes showed the most pronounced reduction, and the " Pseudoeosinophile " leucocytes the most marked increase in the case of the rabbits.

In the dogs the lymphocytes showed a marked decrease and the neutrophiles a marked increase. In the dogs the eosinophiles disappeared entirely by the fourth day after injection.

In a table the author gives his findings with regard to the distribution of the virus in the body.

The virus was present constantly in the " nervous plexus," brain and spinal cord. The submaxillary gland is shown in the table as being positive in eight cases out of ten, and the aqueous humour in six out of seven. In the summary it is said that both of these always contain the virus.

The virus has not been found in the blood, spleen, kidneys, lungs, muscles and bone marrow. It has been found occasionally in the liver (1 case in 10), pancreas (1 in 10), adrenals (2 in 10), and lymphatic gland (1 in 7).

SACHELARIE (V.). **Quelques remarques sur le traitement antirabique chez les bovidés.** [The Antirabic Treatment of Bovines.]—*Archiva Veterinara.* 1923. Vol. 17. No. 1. pp. 1–3.

By antirabic treatment the author means active immunization by intravenous injections of material from the nervous system of a dog infected with street rabies after an animal has been bitten. The matter is one of importance in view of the frequent occurrence of rabies and of the value of cattle, whether for meat or milk production.

Cattle are particularly exposed to the bites of rabid dogs because dogs are so frequently used for protection on farms, and the bites are

the more dangerous from the point of view of rabies because, owing to the habit of lowering the head, cattle are almost invariably bitten about the head or neck.

After referring briefly to the methods and results of some other investigators, the author describes the technique employed by him. Four grammes of grey matter from the brain of a dog recently dead of rabies are emulsified in 20 cc. of salt solution and strained through muslin. This dose is injected into the jugular vein on two successive days, and great care must be exercised to ensure that the dose actually enters the blood-stream, and that none escapes into the perivascular tissues.

Since 1919 17 cattle have been treated in this way without accident. In most cases the injections have been given between the second and fourth days after the bite. One case is referred to in which the injections were made ten days after the animal was bitten. In this case the cow became rabid after a lapse of seven weeks.

It is stated that lactating animals may be injected intravenously with street virus without it being necessary to take the calves off them. Pregnant animals may be inoculated with safety, and healthy calves are produced, even though the cows may become rabid later through delay in administering the inoculations.

KULKARNI (T. N.). **A Case of Rabies in a Goat.**—*Vet. Jl.* 1923. July. Vol. 79. No. 7. pp. 245–246.

A five-year-old she-goat was observed by its owner to be attacking all persons and animals approaching her. She was very restless and bleated at short intervals. When tied up she butted the wall at short intervals and bit pieces of cement from it. The approach of another animal aggravated the symptoms. Frequent arching of the back was observed. Careful examination failed to reveal any evidence of the bite of another animal. While under observation the goat was seen to bite its own thigh. The following days the symptoms were more marked. The eyes were prominent, there was complete loss of appetite, and pronounced restlessness. Death occurred the next day.

The rumen and reticulum contained sand, earth, and some hair. The third and fourth stomachs and the intestines were empty.

Negri bodies were found in the brain.

MYCOTIC DISEASES.

DEKESTER (M.) & JEAUME (G.). **Cas multiples d'une Blastomycose des voies lacrymales observée chez les ânes dans la région de Fez (Maroc).** [Cases of Blastomycosis of the Lachrymal Ducts in Donkeys in Fez.]—*Bull. Soc. Path. Exot.* 1923. July 11. Vol. 16. No. 7. pp. 478–480.

The disease described in this paper has been seen in donkeys only, never in horses or mules. The first cases came under observation two years ago, and all came from Fez and the surrounding districts.

The disease is most frequently seen in animals up to four years old, and it makes its appearance at the beginning of the hot season. It appears to be far from rare, since 27 cases have come under observation within two months.

As a rule only one eye is involved, but both may be affected simultaneously or consecutively. The first symptom is an amber-coloured nasal discharge, and this is followed by a slight conjunctivitis with a semi-purulent greenish discharge.

Subsequently a bud-like swelling is seen projecting from the orifice of the lachrymal duct. The swelling is pink in colour and bleeds very easily. The tumours may attain a considerable size. In one case a tumour was removed which weighed 8 grammes.

Surgical removal is followed by a recurrence in three to four weeks. General health does not appear to be impaired, nor is there any enlargement or suppuration of the glands.

On section the growths are found to be composed of connective tissue which is richly supplied with capillaries, epithelioid cells and large numbers of giant cells. Under a high magnification there are found throughout the specimen, within giant cells and between them, little granules which stain with haematin with a border faintly stained with eosin. They appear to be grouped in batches of five or six, and measure about 3 microns. Similar bodies are to be found in the purulent nasal and conjunctival secretions. They appear to multiply by budding. At places 8 or 10 of these bodies may be found surrounded by a thin capsule. In the same section one may also find groups of refractile corpuscles, each measuring $0 \cdot 5\ \mu$, and surrounded by a thin envelope.

Culture experiments have so far yielded negative results.

MISCELLANEOUS.

ANDREWS (W. H.). **Snake-Bite.**— *Union of S. Africa Jl. Dept. Agric.* 1923. July. Vol. 7. No. 1. pp. 47–59.

The author draws attention to the importance of snake-bite because of the possibility of mistakes being made in diagnosis. Any swelling developing suddenly is usually ascribed to this cause, and there is a danger that diseases such as anthrax may be wrongly diagnosed.

In the author's opinion the actual losses of animals from snake-bite are not very large.

The liability of an animal to snake-bite depends upon the conditions under which it is kept. Dogs, and particularly sporting dogs, are the most frequently attacked. Cattle are more frequently bitten than horses, and sheep are not rarely attacked. Cats are not bitten to the same extent as dogs, although they hunt and kill snakes; it is their caution and rapidity of movement which save them. There is no reason to think that they possess any degree of immunity.

The pig, while certainly not immune, possesses a higher degree of resistance than other animals. Pigs readily devour snakes, and it is reported that they are used in the Mississippi Valley for clearing low-lying land of rattle-snakes. The pig owes its apparent immunity to the nature of its skin and to the underlying fat. Venom is only capable of exerting its action if it reaches the blood-stream, or is brought into direct contact with nerve tissues.

In dealing with the classification of snakes, the author dwells upon the necessity of very close observation for the recognition of venomous

from non-venomous species. He divides the snakes of South Africa into three main groups: non-venomous, semi-venomous, and venomous. A diagram shows the means by which these three groups may be distinguished. The only character which need be examined is the arrangement of the teeth in the upper jaw. In the non-venomous snakes there are two long rows of teeth on each side of the upper jaw. There may be 30–40 in the outer row and 20 or more in the inner. These teeth vary in size in different species, and the distribution of the large and small teeth is not constant, but when carefully examined they are found to be all solid. None of them shows any sign of a groove.

In the very venomous snakes the fangs are well forward in the mouth, and one or two may be found on either side. There may be a few small teeth behind the fangs, but in many species the outer row is quite absent save for the fangs. The membrane lining the mouth is folded in such a way that it forms a sheath for the fangs, so that when the mouth is open the fangs may not be disclosed. The fangs have either a canal running through the centre or a groove along their length which communicates with the venom gland, which lies under the skin and muscle below and somewhat behind the eye. The adders or vipers are distinguished by the flexibility of the front part of the upper jaw The semi-venomous snakes are less easy to distinguish than the venomous, because of the existence of two rows of teeth on each side, but at the hinder part of the outer row there are several grooved fangs. In the smaller species a magnifying glass is necessary for the recognition of these.

The symptoms produced vary with the type of snake inflicting the bite, and with the amount of venom injected.

In the case of the colubrine snakes—cobras, mambas, etc.—the venom acts chiefly upon the nervous system, the venom being conveyed by the blood-stream. In the case of the adders and vipers the principal effects are seen in the tissues round the bite and in the walls of the blood-vessels. But this division is by no means an absolute one.

The symptoms following the bite of a cobra are, broadly speaking, as follows :—

The animal shows a period of excitement, the duration of which varies from a few minutes to hours. Then follows a very variable period during which the animal may appear to be perfectly normal. In most cases this period of quiet is followed by a second phase of excitement. Convulsive muscular contractions appear, and death takes place as a result of cessation of respiration. The heart may continue to beat for some minutes after the cessation of respiration.

If death does not occur from asphyxia, sooner or later a period of general depression sets in, which may be broken by periods of excitement, or may be continuous and terminate in death or gradual recovery.

In the case of adder-bite the symptoms follow much the same sequence, but present the following differences: the symptoms of pain are far more pronounced, the local swelling is much larger, early death from asphyxia is less common, and symptoms of inco-ordination and paralysis are not, as a rule, observed.

The question of the location of the swelling is of importance in connexion with treatment, since the liquids which accumulate under the skin and are responsible for it tend to gravitate.

Treatment may be summarized as follows: It must be started at once. If possible, apply a tight ligature on the proximal side of the bite, and immediately this has been done make cross-cuts over the site

of each puncture, and be certain that these are sufficiently deep. Encourage bleeding—squeezing the affected part. Rub powdered permanganate of potash well into the cuts, and a little strong solution may be injected into the tissues around the bite. Cover the wound with a compress soaked in strong permanganate solution. Calcium hypochlorite solution may be used in place of the permanganate. Stimulants, such as alcohol or coffee, should be given and rugs applied.

RABAGLIATI (D. S.). **Poly-Arthritis in Camels.**—*Jl. Comp. Path. & Therap.* 1923. June. Vol. 36. No. 2. pp. 90–96. With 3 text figs.

The condition described has been observed only in small inferior camels from Somaliland. It was never seen among the thousands of Egyptian, Sudanese, Arabian, Tunisian, Moroccan, Algerian and Indian camels used during the war.

The disease is characterized clinically by stiffness, lameness, and inability to kneel down readily ; and these symptoms are due to ulceration of the articular cartilages of certain joints associated with thickening of the synovial membranes, and in some cases rarefying ostitis.

Camels of all ages are apparently attacked. The disease was noticed soon after the animals arrived in Egypt from Somaliland, and some of those affected showed signs of having been fired for it prior to purchase.

There was no evidence that the condition was a specific one, and attempts to transmit it by inoculation failed.

The lameness was more marked when an animal was first moved, and resting appeared to aggravate it.

Treatment was of no avail, and affected camels were usually fattened for beef.

Bacteriological investigations carried out by MASON yielded negative results.

The ulcerative process appeared to begin in the deeper layers of the cartilage, or at the junction of the cartilage and the bone. The ulcerations varied in size and outline, and in the earlier active stages showed haemorrhagic raised edges. Ulcerations on opposed articular surfaces were not always opposite to each other. The affected joints were never swollen, there was no marked excess of synovial fluid, although the fluid present was sometimes turbid, and pus was never found in the joints.

ADLER (S.) & CLARK (E. J.). **A Case of Acute Ascending Paralysis in a Chimpanzee.**—*Ann. Trop. Med. & Parasit.* 1923. July 12. Vol. 17. No. 2. pp. 299–301.

The chimpanzee (*Anthropopithecus troglodytes*) was captured apparently unharmed, and was chloroformed for the purpose of caging. Recovery from the anaesthetic was rapid. On arrival at Freetown two days later the animal appeared to be in perfect health and condition save for two abrasions on the loins, caused by the chafing of a rope. A week later the animal refused its food, and on examination was found to be completely paralysed in the lower limbs. The paralysis extended rapidly, and two days later the trunk and upper limbs were paralysed ; there was cyanosis of the face and dyspnoea.

An intramuscular injection of novarsenobillon (0·09 gm.) appeared to effect some improvement, although the animal could not swallow solid

food. After an interval of a day the injection was repeated. Four days later fibrillar twitchings were observed in all the muscles and death occurred. At the post-mortem examination slight turbidity of the cerebrospinal liquid and congestion of the surface of the brain and cord were observed.

Microscopically the most pronounced change was vacuolization and varying degrees of degeneration of the nerve cells in the anterior and posterior horns, Clarke's column, medulla and cord.

Experimental inoculations and other circumstances (contact, etc.) indicated that the animal was not affected with acute anterior polyomyelitis.

STIRLING (R. F.). **Seasonal or Non-Contagious Diarrhoea of Cattle in the Central Provinces, India.**— *Vet. Jl.* 1923. July. Vol. 79. No. 7. pp. 239–242.

The disease is observed during June and July, that is, at the beginning of the monsoon. It leads to great loss of condition and, in consequence, inability to work in bullocks, and decreased, or even complete, suppression of the milk in cows. The condition is not a febrile one, the temperature falling in severe cases.

The faeces become very fluid, and are of a bright green colour. They are passed at intervals of about 20 minutes without any evidence of pain or straining. Rumination is suspended and great thirst is evinced.

Nothing is known regarding the cause of the condition. Enquiries were made in the districts, but there was practically no agreement as to which plants are held to be responsible for it. One plant, however, *Cassia tora* (a legume), was reported as a cause from four districts. No information as to any poisonous property of this plant could be obtained. Prognosis is favourable.

Treatment was instituted, and doses of 20 grains of potassium permanganate were given in two pints of water every half-hour until a total of 2 drams of the permanganate had been given ; 285 animals were treated, and all recovered but two. One of these died shortly after admission to the hospital, and the other had not completely recovered from rinderpest. Only 65 of the whole number were under direct observation in hospital. In 11 cases purging ceased after a single dose of the medicine, and in no case were more than six doses given.

THOMSON (J. G.). **The Common Occurrence of Pseudospirochaetes in the Blood of Blackwater Fever Cases, and of Normal Human Beings and Animals when using the Technique of Blanchard and Lefrou.**— *Jl. Trop. Med & Hyg.* 1923. Aug. 1. Vol. 26. No. 15. pp. 251–253.

The author refers to the cases in which spirochaete-like structures have been detected in the blood of blackwater patients, and discusses briefly the probable nature of these.

The technique employed by BLANCHARD and LEFROU was that used by MARTIN, LEBOEUF and ROUBAUD for the detection of trypanosomes. The essence of the method is that citrated blood is centrifuged, the plasma is drawn off and again centrifuged, the process being repeated

a third time. Thomson has used this technique in 15 cases of black-water fever, and has seen the spirochaete-like structures described by BLANCHARD and LEFROU. To quote his own words :—

" In every case the centrifuged deposit of the third tube contained numerous pseudospirochaetes of two types, namely, thick motile filaments from 5 microns to 9 microns in length, and longer extremely fine filaments very actively motile measuring from 7 microns to 12 microns in length. These filaments correspond in every feature to those seen in clotted blood from normal individuals. These objects have no spiral movement, but appear to be actively motile, wriggling and bending on themselves. They are in reality more or less straight filaments without coils or spirals, but occasionally they have a beaded appearance suggesting a chain of streptococci. When fixed and stained they are often thrown into coils as a result of smearing and drying, thus simulating true spirochaetes, but differing from such in that they do not stain so intensely nor so regularly."

The author obtained the same results with a specimen of horse-sickness blood, and with practically all specimens of human blood from apparently healthy people.

He has not been able to obtain any confirmation of BLANCHARD and LEFROU's results following the inoculation of guinea-pigs.

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Compiled by MISS M. H. JAMES.

Note.—Incidence, Treatment, &c., are indexed only under Diseases, and not under Animals Affected by Diseases.

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REPRINTS AND PAMPHLETS RECEIVED.

BALOZET. Etude clinique et expérimentale de l'anémie infectieuse des Equidés au Maroc.—*Bull. Soc. Path. Exot.* 1923. July 11. Vol. 16. No. 7. pp. 525–533.

BARKER (J. R.). Sterility.—*Nat. Vet. Med. Assoc. of Gt. Britain and Ireland, Ltd., Ann. Meeting at York, Aug. 14th, 15th, 16th & 17th, 1923.* 26 pp.

BISHOPP (F. C.). Limberneck of Fowls produced by Fly Larvae.—*Jl. Parasit.* 1923. Mar. Vol. 9. pp. 170–173.

BISHOPP (F. C.), COOK (F. C.), PARMAN (D. C.) & LAAKE (E. W.). Progress Report of Investigations relating to Repellents, Attractants and Larvicides for the Screw-Worm and other Flies.—*Jl. Econom. Entom.* 1923. Vol. 16. pp. 222–224.

BROOKE (W. H.). Gastro-Intestinal Catarrh and Gastro-Enteritis in the Dog.—*Nat. Vet. Med. Assoc. of Gt. Britain & Ireland, Ltd., Ann Meeting at York, Aug. 14th, 15th, 16th & 17th, 1923.* 10 pp.

DAUBNEY (R.). The Adult Tapeworms of Sheep, particularly those occurring in Great Britain.—*Nat. Vet. Med. Assoc. of Gt. Britain & Ireland, Ltd., Ann. Meeting at York, Aug. 14th, 15th, 16th & 17th, 1923.* 14 pp.

GOFTON (A.). The Milk Dairies (Amendment) Act, 1922, and the Milk (Special Designations) Orders (England and Scotland), 1923.—*Nat. Vet. Med. Assoc. of Gt. Britain & Ireland, Ltd., Ann. Meeting at York, Aug. 14th, 15th, 16th & 17th, 1923.* 23 pp.

ILOWAISKY (S. A.) & ZEISS (H.). "Bayer 205" bei experimentalem Su-aurù von Kamelen.—*Rev. Microbiol. & Epidemiol.* Saratov. 1923. Vol. 2. No. 1–2. p. 95.

O'CONNOR (J. J.). Purulent Fistulae.—*Nat. Vet. Med. Assoc. of Gt. Britain & Ireland, Ltd., Ann. Meeting at York, Aug. 14th, 15th, 16th & 17th, 1923.* 15 pp.

PFEILER & FRANZ. Die Spezifisch-Nichtspezifische Therapie. Kasuistische Mitteilungen ueber Behandlung von Erkrankungen der oberen Luftwege und der Druse.—Reprinted from *Ztschr. f. Veterinärk.* 1923. No. 5. 8 pp.

PFEILER, WERNER & BREITENSTEIN. Mitteilungen einige Versuche mit Presojod bei der enzootischen Rückenmarks-Lähmung der Pferde.—Reprinted from *Tierärtzlichen Rundschau.* 1923. No. 30. 8 pp.

RAO (M. Anant Narayan). Observations on the Morphology and Life-Cycle of *Filaria recondita* Grassi.—*Agric. Res. Inst. Pusa.* 1923. Bull. No. 144. 7 pp. With 12 figs. & 1 chart. 1923. Calcutta. [Price 6 annas.]

SCHNITZER (R.) & MUNTER (F.). Ueber Zustandsänderungen der Streptokokken im Tierkörper. III. Mitteilung.—*Ztschr. f. Hyg. u. Infektionskr.* Vol. 99. No. 4. 1 p.

WELLS (R. W.), BISHOPP (F. C.) & LAAKE (E. W.). Derris as a Promising Insecticide.—*Jl. Econom. Entom.* 1922. Feb. Vol. 15. pp. 90–95.

Note.—On direct application (not through agents or booksellers) any of the foregoing reprints or pamphlets will be sent on loan to any part of the world, the Bureau paying outward postage.

REPORTS RECEIVED.

ASSAM. Report of the Civil Veterinary Department, Assam, for the Year 1922–23. [SEN (G. P.), Offg. Supt., Civil Vet. Dept.]—pp. 2 + 15. 1923. Shillong: Assam Secretariat Printing Office. [Price 8 annas =9*d.*]

NIGERIA. Annual Report on the Veterinary Department, for the Year 1922. [BRANDT (F. R.), Chief Vet. Officer, Northern Provinces.] —2 pp. Lagos: Govt. Printer. [Price not stated.]

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