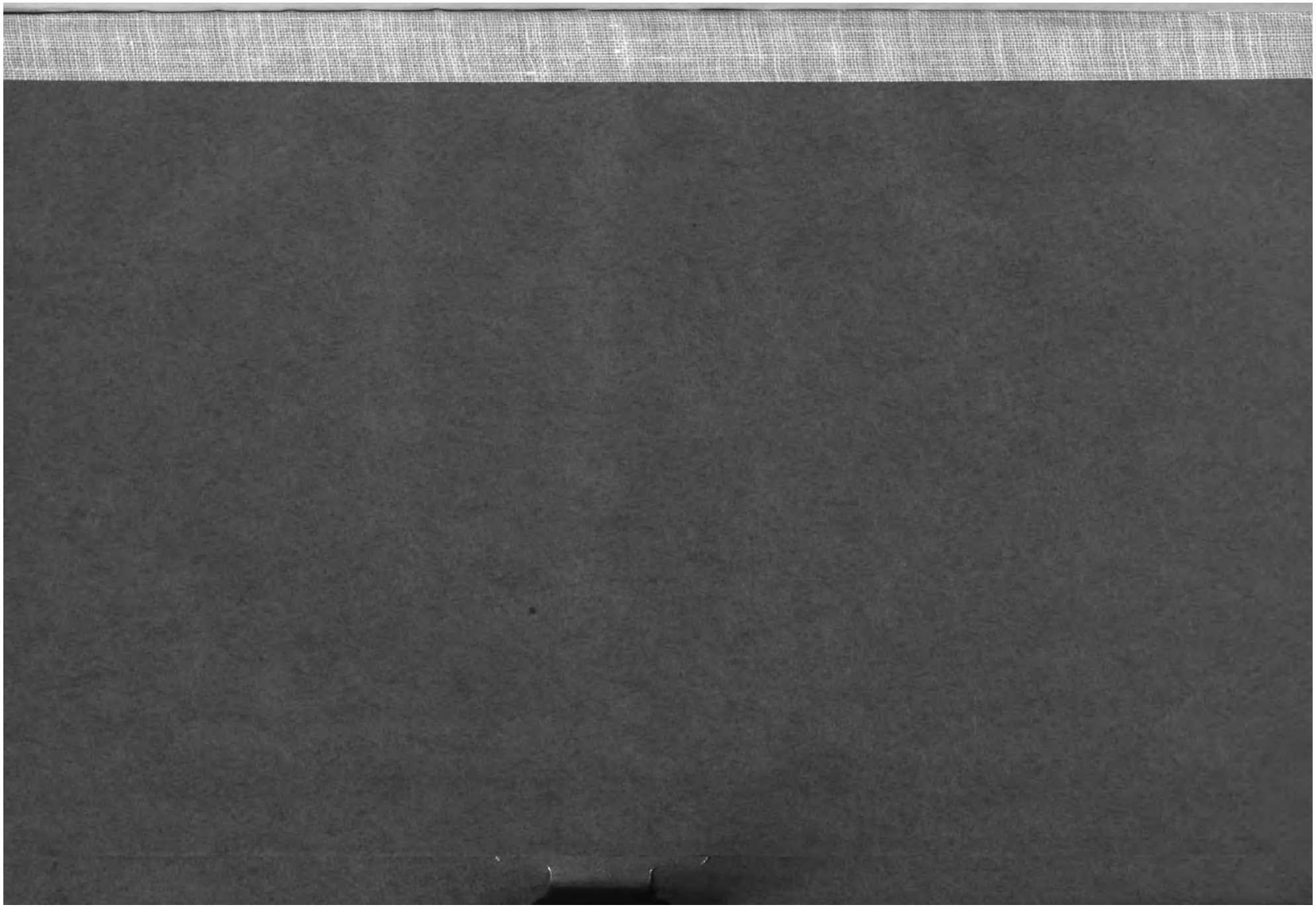

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Vol. 11, No. 1, p. 7, line 19 from bottom. Paper on "Nagana and the Tartar Emetic Treatment." Author's name should read "CURSON (H. H.)," and not "CARSON (H. H.),

Vol. 12, No. 2, p. 56, LANE summary, line 10, *for* symmetrical (bursa of Heligmosomum or Nippostrongylus) *read* asymmetrical.

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TROPICAL DISEASES BUREAU.

TROPICAL VETERINARY BULLETIN.

VOL. 12.] February 29, 1924. [No. 1.

DISEASES DUE TO PROTOZOAN PARASITES.

MANSFIELD-ADERS (W.). **Trypanosomiasis of Stock in Zanzibar.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. June 21. Vol. 17. No. 3. pp. 192–200.

Trypanosoma congolense is found to occur throughout Zanzibar Island, save among stall-fed cattle in the town, but it does not appear to cause any pathological condition. Animals known to harbour the parasite remain in apparently perfect health for years. It is suggested that a possible explanation of this is that Glossina has never been found in the island and that as a result cyclical developments cannot take place.

Tabanidae are the chief factors, but Stomoxys and Lyperosia also play a small part. The local goats do not harbour the parasite, nor have Tabanidae been observed to feed upon the goats. Possibly their long hair, restlessness and odour protect them. Cattle, sheep, goats, donkeys, monkeys, lemurs, and giant rats are susceptible to infection. Guinea-pigs are resistant. Passage through goats, sheep and giant rats exalts the virulence for other species, but does not appear to reduce it for these species.

DUKE (H. Lyndhurst). **The Transmission of** *T. congolense* **by** *Glossina palpalis.*—*Ann. Trop. Med. & Parasit.* 1923. Dec. 21. Vol. 17. No. 4. pp. 511–530.

In all the species of Glossina in which cyclical development of *T. congolense* takes place, multiplication takes place first in the gut and later the parasites are to be found in the labrum and hypopharynx of the proboscis. Apart from cyclical transmission, however, the trypanosome can be carried from mammal to mammal directly.

The author holds that small variations in pathogenic properties are not sufficient to make specific differences, and points out that the group should be considered as a collection of strains of trypanosomes whose behaviour in the intermediary insect is constant, but whose pathogenicity for mammalian hosts is liable to variation. As there is evidence to show that persistent propagation of *T. brucei* from animal

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to animal by inoculation may enhance the virulence for the animal while decreasing or even eliminating the power of cyclical development in the fly, so observation in the field indicates that the more virulent strains of *T. congolense* appear to rely very largely upon direct transmission for their passage from animal to animal. It has not yet been determined whether such strains have lost their power of cyclical development in the fly.

Except in the case of the elephant, buffalo, and eland, the conditions necessary for direct transmission seldom occur among game, while with domestic stock there is every opportunity for this method of spread.

While game are not affected by even double infections of trypanosomes, cattle rapidly succumb to contact with game-tsetses and are specially susceptible to *T. congolense* in non-tsetse areas. In areas where game-tsetses are present and game is plentiful wild fly can always be found showing developmental forms of the proboscis-gut group of trypanosomes. This group of trypanosomes is rarely found in *G. palpalis* areas. In these areas *T. vivax* and *T. uniforme* (the " proboscis only " group) and *T. gambiense* (the " gut-and-gland " group) are of frequent occurrence.

It appears that *G. palpalis* is not suited to the cyclical transmission of *T. congolense* in its natural environments. A partial explanation of this may be that the flies come into contact with strains which are directly transmitted and which have lost their power of cyclical development in the fly.

The author reviews previous records of experiments regarding the transmission of the " proboscis-gut " group of trypanosomes by *G. palpalis*, and gives details of his own experiments in which a strain of *T. congolense*, known to be a strain carried cyclically by wild fly, was used. The strain was, however, of low virulence.

It was found that flies showing a proboscis infection may feed upon a clean animal without causing infection, but it was noted that in every case in which this happened the animal was a monkey or a dog, but whenever a calf was bitten by fly with infected proboscis infection occurred. Experiments designed to show whether a fly may be infective for a ruminant but unable to infect a dog or a monkey cyclically unfortunately failed to furnish proof owing to death of the flies before the completion of the experiments. Observations appeared to indicate that cyclical transmission of *T. congolense* tends to lower the virulence for the dog and monkey, while directly transmitted strains are of higher virulence for them.

STUART (George) & KRIKORIAN (K. S.). **Observations on *Trypanosoma evansi* based on its Occurrence in Two Outbreaks of Surra in Palestine.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. Oct. 18. Vol. 17. No. 4. pp. 254–259. With 1 text fig.

A trypanosomiasis of camels attracted attention during the summer of 1919 and examination of cases showed that the parasite was *T. evansi*. In the early part of 1923 a similar trypanosome was found in the blood of horses and mules from Northern Palestine. A mule having this infection was sent to the Laboratory at Jerusalem for further investigation. Clinically the animal showed anaemia, fever, lethargy, pallor and jaundice of the mucous membranes, swelling of dependent parts, and loss of power in the hind limbs.

Although smears from this animal had frequently shown trypanosomes, none could be detected from the date when the animal came under observation at the laboratory. It was found possible to infect guinea-pigs and rabbits by inoculation, and the morphological description of the parasite given in this paper would appear to have been based upon examination of specimens from these animals.

The trypanosome is described as being actively motile but without power of rapid progression. It was monomorphic and ranged from 20 to 32 μ in length. The posterior extremity was pointed, the undulating membrane slightly developed and the flagellum long. The protoplasm was granular, but not markedly so. The kinetonucleus was situated posteriorly in some, less so in others, but always occupying a distinctly lateral position. The blepharoplast was well seen.

In the experimental inoculations 5 cc. of citrated blood was used for the inoculation of rabbits, guinea-pigs and rats.

In the first set of experiments two guinea-pigs and two rabbits were used. One of the rabbits died of intercurrent disease, the other first showed trypanosomes on the 34th day. It is noted that changes in the red corpuscles indicative of anaemia were seen for several days prior to the appearance of the parasites. One of the guinea-pigs showed trypanosomes on the 40th day and died a week later. The other failed to become infected.

The second series of inoculations was carried out before the first series gave evidence of being successful. Three guinea-pigs, two white rats, and two rabbits were each inoculated intraperitoneally with 5 cc. of citrated blood from the mule. It is stated that in order to cause a greater number of parasites to appear in the blood of the mule a subcutaneous injection of 0·13 gramme of arecoline hydrobromide was given, this drug being credited with the property of driving trypanosomes into the circulation. " The reaction to the drug was instantaneous," it is said, but the nature of the reaction is not indicated. It would not appear that trypanosomes made their appearance in the circulation of the mule in such numbers as to render their detection by the microscope possible, because it is definitely stated elsewhere in the paper that trypanosomes were not seen at any time in the animal's blood after it came under observation at the laboratory.

SWYNNERTON (C. F. M.). **A Critical Summary of the Preliminary Observations on the Sleeping Sickness Outbreak near Mwanza.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. June 21. Vol. 17. No. 3. pp. 142–150. With 1 sketch map.

The author's observations suggest that direct transmission from man to man is not uncommon, that man is the sole reservoir, and that game act as a protective, but no dogmatic statements to this effect are made. Emphasis is laid upon the necessity of further investigation.

BESSEMANS (A.) & LEYNEN (E.). **Valeur de la réaction de Bordet-Gengou appliquée au diagnostic de la dourine chez le cheval.** [The Bordet-Gengou Reaction in the Diagnosis of Dourine in Horses.]—*C. R. Soc. Biol.* 1923. June 9. Vol. 89. No. 20. pp. 107–109.

The authors give details of 5 cases in which positive reactions have been obtained although the animals have not given any clinical evidence of infection.

The authors believe that the test is of very great value for the diagnosis of dourine. They base this opinion on (1) the positive

results obtained with clinically infected animals, (2) the persistence of the reaction in animals which have once reacted, (3) the absence of all reaction in the case of animals which cannot be suspected of being infected on any grounds whatever. Positive reactions are generally first obtained on the appearance of symptoms, but in some cases a reaction may precede the symptoms by a period of two months or more.

HORNBY (H. E.). **A Note on the Value of the Serum-Formalin Reaction in the Diagnosis of Trypanosomiasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. Oct. 18. Vol. 17. No. 4. pp. 265–266.

Hornby has carried out tests upon the serum of a number of oxen using the technique described by PLANTUREUX for the detection of infection with *T. berberum* in camels, but reaches the conclusion that the reaction is not likely to be of any value for the diagnosis of the common forms of bovine trypanosomiasis in Central Africa.

Blood was drawn from the jugular of 28 normal oxen which had been under observation for months and were apparently free from trypanosome infection and a sample of 1 cc. of serum was taken from each. To each tube 2 drops of commercial formalin were added. The liquids were mixed and the tubes were inspected at 6, 12, 24, 48 and 72 hours.

The contents of all the tubes had " set " within 72 hours. Nine set in less than 6 hours, 5 between 6 and 12 hours, 6 between 12 and 24 hours, 5 between 24 and 48 hours, and 3 between 48 and 72 hours.

According to PLANTUREUX the reaction is positive if setting occurs within 3 days. Only one " fly-struck " ox was available for experiment, but it was known to have been infected with *T. vivax* for a long time. It showed no symptoms and had not been treated medicinally. The serum set very solidly in 6 hours.

VAN SACEGHEM (R.). **Action des composés de bismuth dans la trypanosomiase.** [Bismuth Compounds in the Treatment of Trypanosomiasis.]—*Bull. Soc. Path. Exot.* 1923. Oct. 10. Vol.16. No. 8. pp. 587–589.

The author has tested bismuth hydroxide and tartro-bismuthate of sodium and potassium by intramuscular and intravenous injection respectively on cattle infected with *T. congolense.* The former has no trypanocidal action and is an irritant when injected under the skin. Tartro-bismuthate of sodium and potassium in 2 gramme doses intravenously is fatally toxic for cattle. It has no trypanocidal effect.

BRUMPT (E.) & LAVIER (G.). **Mode d'action du Bayer 205 sur les infections expérimentales à *Trypanosoma equinum* et à *Trypanosoma pecaudi.*** [The Action of Bayer 205 upon Experimental Infections with *T. equinum* and *T. pecaudi.*]—*Ann. Parasit. Humaine et Comparée.* 1923. Aug. Vol. 1. No. 3. pp. 247–251.

The strain of *T. equinum* used was obtained from BEAUREPAIRE-ARAGÃO (Rio de Janeiro) and that of *T. pecaudi* was derived from a naturally infected horse in Senegal. Mice were used in the experiments.

The paper, though short, is divided into 4 parts dealing with the curative and protective effects of the drug in the case of *T. equinum* and the same effects in infections due to *T. pecaudi.*

Seven out of 10 mice inoculated were subjected to treatment, the remaining three serving as controls. With a dose of 1 mg. two out of three mice recovered. With 0·5 mg. both the mice treated recovered. Two mice received 0·25 mg. Both made apparent recoveries, but both had relapses and died a month afterwards.

Blood was taken from treated mice 2 and 4 hours after treatment and injected into fresh animals. The two mice injected contracted the infection and died, but the course of the disease lasted 21 and 28 days in the place of the 6 days observed in mice inoculated with the fully virulent trypanosomes.

In testing the protective value of the drug six mice were given 5 mg. intraperitoneally and were subsequently inoculated with *T. equinum* at intervals varying from 7 days to 78 days. In no case did infection occur.

In the experiments with *T. pecaudi* eleven mice were used, and of these three acted as controls.

Of four mice receiving 1 mg., two died because treatment was unduly delayed, one died two days after treatment, and one survived. Of three receiving 0·5 mg., one died owing to delay in treatment and the remaining two survived.

One mouse, which it is noted was rather smaller than the others, received 0·25 mg. and recovery followed.

Mice injected intraperitoneally with 5 mg. were subsequently inoculated with virulent trypanosomes at intervals ranging from 7 to 71 days. In no case did infection occur.

BRUMPT (E.) **Mode d'action du Bayer 205 sur les infections mortelles dues au** *Trypanosoma inopinatum* **chez la grenouille verte** (*Rana esculenta*). [The Action of Bayer 205 upon Fatal Infections in the Green Frog (*Rana esculenta*) caused by *Trypanosoma inopinatum*.]—*Ann Parasit. Humaine et Comparée* 1923. Aug. Vol. 1. No. 3. pp. 252–261.

In the experiments performed it was found that Bayer 205 acts efficiently but slowly in the treatment of infections with *T. inopinatum* in frogs.

The drug, however, exercised no effect upon *T. rotatorium*, the microfilariae, the haemogregarines, haemorrhagic septicaemia, and a peritonitis of undetermined nature in frogs.

Bayer 205 appeared to be without effect upon pathogenic cultures of *T. inopinatum*, but it appeared to be effective for the destruction of *T. inopinatum* in citrated blood. The latter experiments require repetition. The medicament exercises a protective effect, the duration of which has not been determined.

Since Bayer 205 does not kill *T. inopinatum* in vitro, in the blood or in cultures, one is driven to the conclusion that its efficacy in the treatment of infected frogs is due to some indirect action.

BAERMANN (G.). **Die Behandlung der Surra mit "Bayer 205." II. Mitteilung.** [The Treatment of Surra with "Bayer 205." 2nd Communication.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1923. July. Vol. 27. No. 6. pp. 210–217.

In this paper the author summarizes some results previously obtained in the treatment of guinea-pigs and rabbits infected with surra, and results obtained in the treatment of experimentally infected horses, a buffalo, a sheep, and a goat.

The author found that the dose required for a permanent cure in guinea-pigs was ·06 g. per kilog. and in rabbits ·075 g. per kilog. Naturally infected horses require a course of treatment comprising from four to six doses. The dose usually employed was 5 g. to 6 g. In naturally infected animals the drug may bring the infection to a standstill, but fatal relapses may occur.

The author does not think that the trypanosomes become " fast " to the drug.

SEI (Shigemoto). **Über den Nachweis von " Bayer 205 " in den Organen behandelter Tiere.** [The Demonstration of " Bayer 205 " in the Tissues of Treated Animals.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1923. Aug. Vol. 27. No. 8. pp. 257–268.

Guinea-pigs were given two large doses of Bayer 205 and they were then bled to death. Extracts of organs were made with salt solution containing carbolic acid and the extracts were injected into animals infected with trypanosomiasis. The results indicated that the drug was present in the extracts as indicated by the course of the trypanosome infections. The kidneys appeared to contain most, then the liver and suprarenals, followed by the spleen and lungs. The brain and bile were without effect. The liver was in many cases toxic. No toxic effects were produced with any extract a month after the drug had been administered. The effects of the extracts cannot be considered as due to the serum or blood contained in them.

VAN DEN BRANDEN (F.) & VAN HOOF (L.). **Résultats de l'observation de malades trypanosomés traités au Tryparsamide " A63."** [Results of Treatment of Cases of Human Trypanosomiasis by Tryparsamide (A63).]—*Bull. Soc. Path. Exot.* 1923. Oct. 10. Vol. 16. No. 8. pp. 606–615.

This paper contains a number of detailed records of observations upon natives treated with tryparsamide. The cases are grouped under two main headings, (1) those in which the spinal fluid was normal, (2) those in which the fluid was abnormal. The bulk of the paper does not lend itself to abstraction, but the authors' conclusions may be summarized.

The first group comprised 20 cases. The quantity of the drug administered in the course of the treatments ranged from 2 to 54 gms. In every case there was an apparently complete recovery and the periods for which the cases were under observation ranged from 6 months to 2 years and 7 months. The authors consider this a very flattering result, but they are inclined to think that their series of cases was a particularly fortunate one.

The second group comprised 35 cases, and of these 11 showed a diminution, which was in some cases very marked, in the lymphocytosis. Three cases terminated fatally shortly after treatment. In 16 instances the spinal fluid became normal. In most of these cases the lymphocytosis was slight. In one case blindness ensued after the treatment. In three cases the lymphocytosis progressed in spite of the treatment, and in two it remained stationary.

Tryparsamide may be used for either intramuscular or intravenous injections, but it has the disadvantage of causing a tendency to blindness.

SERGENT (Edm.) & DEGUILLAUME (A.). **Tableau généalogique d'un trypanosome du dromadaire conservé quatre ans par passages sur cobayes. Augmentation de sa virulence.** [Modification of the Virulence of a Trypanosome originally derived from a Dromedary during repeated Passages through the Guinea-Pig, over a Period of Four Years.]—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1922. Dec. Vol. 2. No. 4. pp. 469–473. With 1 chart.

During the period May 1918 to June 1922 the strain, which was isolated from a chronic case of the disease in a dromedary (*T. berberum*), passed through 55 passages, involving the use of 111 guinea-pigs. In a tabular statement the author gives the average duration of life of the guinea-pigs in groups of 5 passages. During the first 5 passages this was 116 days. During the next it was 70. During the third 32, and during the fourth 52·4. The virulence then appeared to become exalted, for the average duration of life of the guinea-pigs comprising the 21st to the 25th passages was only 18. After this the virulence appeared to be more or less fixed, and there was also a more or less constant reduction in the period of incubation.

BRUMPT (E.). **Description d'une nouvelle espèce de trypanosome, *Trypanosoma crocidurae*, chez une musaraigne** (*Crocidura russulus*). [A New Species of Trypanosome, *Trypanosoma crocidurae*, in a Shrew.]—*Ann. Parasit. Humaine et Comparée.* 1923. Aug. Vol. 1. No. 3. pp. 262–264. With 2 text figs.

The parasite was found in the blood of two out of three animals examined. In general form it resembled *T. lewisi*, but its cytoplasm was granular, the nucleus was sometimes not very clearly visible and was generally placed nearer the middle point of the body than is the nucleus of *T. lewisi*. The author attempted to transmit the parasite to young rats and young mice, but without success.

LEGER (Marcel) & BAURY (A.). **Trypanosome de la Chauve-Souris du Sénégal *Hipposiderus tridens* Et. Geoff.** [Trypanosomes of the Bat in Senegal.]—*C. R. Soc. Biol.* 1923. Apr. 14. Vol. 88. No. 12. pp. 866–869. With 1 text fig.

The parasite described in this paper appears to be distinct from those already recorded as occurring in the bat in other parts of the world. It was found in 25 out of 30 captured.

The parasite, which is about 30 μ in length excluding the free flagellum, which measures 7 to 15 μ, is motile, but the motility does not involve any translation. The parasite is about 7 μ wide at the centre of the body. The body stains in an irregular manner. The posterior extremity is pointed. The nucleus is oval or rounded and is placed anterior to the centre of the body. The centrosome, which is either round or rod-shaped, is always placed near the nucleus. The undulating membrane usually shows 3 to 5 folds. Free flagella with centrosomes attached are not infrequently found in preparations ; no parasites have been observed in the process of division. When blood is examined from a bat that has been dead for several hours rounded forms are often encountered. Occasionally very large parasites containing 3 or 4 nuclei have been seen. The trypanosome appears to be non-pathogenic and is not inoculable to the guinea-pig and dormouse.

The authors suggest the name *T. morinorum* (after Drs. J. & H. MORIN).

RODHAIN (J.). **Trypanosome d'un Cheiroptère insectivore *Nycteris hispida* Schreber au Congo belge.** [A Trypanosome of *Nycteris hispida* Schreber in the Belgian Congo.]—*Bull. Soc. Path. Exot.* 1923. Nov. 14. Vol. 16. No. 9. pp. 659–663.

The parasite described appears to be a new species. Of 46 adult bats examined 36 were found to be infected, but no infections were detected among 13 young species examined.

NICOLLE (Charles) & ANDERSON (Charles). **Recherches expérimentales sur le mode de transmission du kala azar.** [The Experimental Transmission of Kala Azar.]—*Arch. Inst. Pasteur de Tunis.* 1923. July. Vol. 12. No. 2. pp. 168–198. With 2 text figs.

The authors point out that the view has been expressed by a number of investigators that the transmission of kala azar occurs through the medium of fleas, but proof has not been furnished.

They deal at some length with the difficulties which hedge the problem about and they show that the only possibility of gaining knowledge of any value lay in the experimental transmission of the canine infection from dog to dog. They do not wish to imply that the disease in dogs is identical with that occurring in children, but they state that experimentally they are similar.

In the present paper the authors divide their subject matter into two parts. The first part contains an account of the maintenance of the parasite by passage in dogs, and the second an account of their experiments designed to prove or disprove the theory that fleas are responsible for its transmission under natural conditions.

Their investigations are being pursued. The authors emphasize the fact that for the successful maintenance of the organism in dogs it is necessary to use large doses of infective material for inoculation, and that a very severe case must be selected as the starting point of a series of inoculations. Inoculations must be made with fresh material. Bone marrow is the best material to use for inoculation, or failing that, the spleen if that is heavily infected. The inoculation should be made into the peritoneal cavity.

In their transmission experiments the flea used was *Ctenocephalus canis*, a parasite abundantly present in Tunis and one which if the disease is transmitted by fleas would almost certainly be incriminated.

The authors detail at considerable length the precautions taken and the scrupulous care exercised to prevent external parasites other than those employed for the experiment from gaining access to the dogs used.

Four experiments involving the use of eight dogs have been carried out. Two of these survived for too short a period to be of any value. The remaining six were exposed to the bites of fleas from infected dogs for periods of 3 to 7 months, and in no case was the disease produced. The experiments were distributed through the year from spring to autumn.

Proof is therefore still lacking that *Ctenocephalus canis* is responsible for the transmission of canine leishmaniasis.

BUXTON (P. A.). **Canine Leishmaniasis not found in Jerusalem.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. June 21. Vol. 17. No. 3. p. 212.

Out of 1,000 stray dogs the author has examined 156 for Leishmania but without success.

NIESCHULZ (Otto). **Een Geval van Giardia-Infectie bij een Kalf.** [A Case of *Giardia* Infection in a Calf.]—*Tijdschr. v. Diergeneesk.* 1923. Nov. 1. Vol. 50. No. 21. pp. 733–735. With 2 text figs. [German summary p. 735.] [3 refs.]

The author states that he has found cysts of a species of *Giardia* " in a young calf." [Presumably he found them in the faeces, but this is not stated: and as he writes from Utrecht, presumably the observation was made in Holland; but this also is not stated.] Free flagellates were not seen, and the organism is therefore briefly described from its encysted forms only. Measurements of 100 fixed and stained cysts were made, from which it appears that their mean length was 10μ, their mean breadth 5·2μ. Comparison of these cysts with those of *G. intestinalis*, *G. muris*, and *G. canis* leads the author to conclude that they probably belong to a distinct new species. No name is proposed for it, however, and the question of specificity is left open. [It must be observed that the author—for some unexplained reason—apparently adopted the fallacious method of measuring the protoplasmic contents of his cysts, instead of the cysts themselves. It is thus impossible to compare his measurements with those of others. One of his figures depicts a cyst whose length is actually greater than 13μ—which he gives as a maximum. His measurements of *G. intestinalis* evidently suffer from the same defect, and are not comparable with the measurements of this species recorded by other workers.]

According to the author this is the first recorded case of *Giardia* infection in cattle.*

NIESCHULZ (Otto). **Over de Darmamoeben van het Varken.** [On the Intestinal Amoebae of the Pig.]—*Tijdschr. v. Diergeneesk.* 1923. Nov. 1. Vol. 50. No. 21. pp. 736–740. With 9 text figs. [Germany summary pp. 739–740.] [16 refs.]

In this paper the author redescribes the intestinal amoebae already known to occur in pigs. The *Iodamoeba* of the pig he regards—without adding any new evidence—as identical with that of man, and he denominates it *I. williamsi*. The chief novelty in the paper is the proposal to separate the smaller forms of *Entamoeba* commonly found in pigs as a distinct species, for which the name *E. debliecki* is proposed. This " new species " [included by other workers in *E. suis*] is allotted the following distinctive characters: Free amoeba, when rounded, 5–9μ in diameter; nucleus 1.5μ–2.5μ, its peripheral chromatin in coarse irregular lumps, its karyosome fairly large and usually central. Cysts uninucleate, with chromatoid bodies. [No dimensions given.] The author found this form in 4 pigs at Utrecht.

[It can hardly be allowed, on the evidence here presented, that the author has proved the existence of *E. debliecki* as a distinct species.]*

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

DE MELLO (Froilano) & PAES (Santana). **Sur une plasmodie du sang des chèvres.** [Plasmodium of the Goat.]—*C. R. Soc. Biol.* 1923. Mar. 24. Vol. 88. No. 11. pp. 829–830.

The authors describe the occurrence of a plasmodium of the genus *Laverania* in four goats at Callumbo (Angola). The animals had been isolated on account of the existence in each of them of a submaxillary abscess. The animals were not appreciably anaemic.

The schizogonic cycle comprised : (1) small ring-shaped schizonts with one, or in some cases two, chromatin granules at the margin and with one or two small granules of nearly black pigment in the cytoplasm. (2) Adult schizonts which presented variable appearances. In these it was exceptional to find two granules of chromatin which were placed at or near the margin. The cytoplasm was alveolar, and pigment was present in some of the parasites only. In these it occurred as one or two small granules close to the nucleus. (3) In the process of schizogony nuclear fragments up to 10 in number have been counted. As many as 13 fully formed merozoites have been counted in a single parasite. The merozoites were rounded or oval, and their pigment was concentrated in the centre of each. The female gametes were oval or falciform, their cytoplasm alveolated and stained blue, the nucleus was surrounded by a halo, and the pigment was scattered throughout the cytoplasm. The male gametes were smaller, oval, and the cytoplasm stained pink or pale purple, and the pigment was concentrated at the extremities.

The invaded corpuscles were not enlarged, and neither Schüffner's nor de Maurer's dots were seen. Small schizonts measured 1·5 to 2 μ, female gametes 5–6 μ by 2–2·5 μ, and male gametes 3·5–4·5 μ by 1–2 μ.

The authors suggest the name *Laverania caprae.*

SENEVET (G.) & WITAS (P.). **Évolution spontanée de l'infection à *Haemoproteus columbae* chez deux pigeons.** [Spontaneous Development of Infection with *Haemoproteus columbae* in Two Pigeons.]—*Arch. Inst. Pasteur de l'Afrique du Nord.* 1922. Dec. Vol. 2. No. 4. pp. 481–488. With 1 chart.

The first case of infection which was under long continued observation occurred in a pigeon which was caught when about a month old. The bird had just been turned out of the nest. It was able to walk with difficulty only. Its head had not got its complete covering of feathers. The blood was examined daily at first and subsequently at short but constant intervals of a few days. These examinations showed that parasites first appeared in the blood three weeks after the bird was captured. The number of parasites present increased rapidly until 50 or more could be seen in a single field under the immersion lens. Then there was a rapid fall which became slower as the parasites decreased in number. Parasites were absent for a few days during the fourth month. They again appeared and reached a maximum of five per field during the fifth month. They then disappeared again. For five months examination of the blood was negative. Parasites were present again for a month about one year after the bird was caught. During the whole period of captivity the pigeon was kept in an insect-proof cage. This bird must have had very few opportunities of becoming infected, even if it had more than one, before it was caught.

The second bird was obviously older than the first. Actual counts of the parasites present were not made in this instance, it was merely noted whether parasites were present or not. The periods during which parasites were found were more prolonged than in the case of the first pigeon, and during the intervals one or two gametes were occasionally encountered.

An effort was made to increase the number of parasites present in the blood by allowing 20 *Ornithodorus marocanus* to bite the pigeon. No increase was observed.

PHISALIX (Mme.). **Coccidiose intestinale de la vipère aspic à** *Cyclospora viperae* **n.sp.** [Intestinal Coccidiosis in a Viper due to *Cyclospora viperae* n.sp.]—*Bull. Soc. Path. Exot.* 1923. Nov. 14. Vol. 16. No. 9. pp. 637–642. With 2 text figs.

The author has examined 45 vipers and of these 41 were found to harbour the parasite. The complete sporogonic and schizogonic stages have been observed, but the former was encountered with far greater frequency. The parasites occur in the anterior two-thirds of the intestine, but are not found anterior to the spleen and pancreas.

Schizonts may be as small as 4 μ in diameter and may present from 1 to 4 nuclei. The larger schizonts, which are slightly ovoid, may have as many as 18 nuclei.

Microgametocytes, like schizonts, usually take up a position between the free margin of the epithelial cells and the nucleus, but they may be encountered near the basement membrane. When fully developed a microgametocyte may measure 15 μ in diameter; the microgametes are comma shaped and measure about 2 microns in length. No " cilia " have been observed either in fresh material or in sections. Macrogametes are usually found in the deeper parts of the epithelial cells, and young parasites measure 10–13 μ in their longer diameter. They possess a large central nucleus measuring about 4 μ in diameter. The cytoplasm stains faintly and has a reticulated appearance.

Mature oocysts measure 10·5 by 7·5 μ. The contents on division give rise to 2 sporoblasts and these in turn give rise to 2 sporozoites each. It is not stated whether sporozoite formation occurs before the parasites gain the outer world.

In an experiment three recently born vipers were fed with material containing oocysts, and were killed 24 hours later. The envelopes of oocysts and sporocysts were found in their stomachs, and invasion of the epithelium had begun in the anterior part of the small intestine.

LERCHE. **Nierencoccidiose bei Hausgänsen.** [Coccidiosis of the Kidney in the Goose.]—*Zeitschr. f. Infektions Krankh. parasit. Krankh. u. Hyg. d. Haust.* 1923. No. 1. Vol. 25. No. 2–3. pp. 122–133. With 1 plate.

The author draws attention to the scanty references in literature to this disease, and states that he has had the opportunity of studying it in two separate cases. He thinks that the disease is possibly more common than has been supposed. The inconspicuous nature of the lesions in the kidneys, and possibly also the fact that these organs are not subjected to examination very frequently, may possibly explain the absence of references to the condition. The detection of the disease in two districts will permit further investigations to be made with a view to gaining some information regarding its distribution.

Infected geese generally die at about the age of two months. The symptoms are not always the same. Sometimes there is slight dullness but without loss of appetite, but in some cases the birds appear to be unable to keep their balance.

Infected geese show symptoms for two or three days before the disease terminates fatally, and the mortality is from 80 to 100 per cent.

The lesions are : moderate to marked wasting, in some cases catarrh of the intestine, and the lesions in the kidneys. The kidneys are smooth and shining on the surface and their colour ranges from greyish yellow to reddish brown. On close inspection small yellowish white centres can be seen scattered through the organs. They vary in size somewhat, but on an average are a little larger than a pin's head. The kidneys also show a fine white streaked appearance. These streaks result from the accumulation of the salts of uric acid. When the kidneys are removed they appear as sausage-like structures from 5 to 6 centimetres in length and 1 to 2 centimetres in thickness. The ureters are dilated and contain white, yellowish white or yellowish green contents.

Examination of the intestinal contents did not reveal any coccidia, while the contents of the ureters showed them to be present in large numbers, as did smears from the kidney tissue.

The oocysts are rounded or ovoid in shape and measure from 14 to 22 μ in length by 11 to 15 μ in breadth. They have a distinctly double contoured envelope which has a greenish tint. The smaller pole is slightly flattened and shows a micropyle which is from 1·3 to 2 μ in diameter. In some parasites this orifice has a small refractile body which effects its closure. In some it appears to be unobstructed in any way, while in still others it is covered by a transparent membranous substance between it and the oocyst wall, while in other parasites it cap-like structure. This sometimes appears to have a jelly-like consistence and invests the oocysts closely.

The contents of the oocyst are a granular mass of protoplasm which at first fills it entirely, but subsequently becomes retracted into a rounded mass, in the centre of which is a vesicular nucleus.

Parasites from the ureters were made to develop by placing them upon moist blotting paper in Petri dishes. Sporulation took place in 24 hours in some of the parasites, but after five days 50 per cent. of the parasites has sporulated. The process of sporulation closely resembled that seen in *Eimeria stiedae*, and as in that parasite, four sporocysts each containing two sporozoites were formed. Granular rest bodies are left in the processes of sporoblast and sporozoite formation. Parasites obtained from the kidneys were kept under observation in addition to those from the ureters, but in these, save in a few instances, no sporulation occurred within 5 days, but, on the other hand, evidence of degeneration was detected. The author believes that this failure of the kidney parasites to sporulate is due to the fact that the kidney parasites have not completely developed their capsule.

Schizonts are very scantily present in the lesions, and in consequence it is not possible to say what is the usual number of merozoites formed, but the author thinks that they are numerous. The schizonts before division measure about 13 μ in diameter. The individual merozoites measure from 4·7 to 6 μ in length by 1·36 to 2 μ in thickness. They have a central nucleus.

The macrogametes measure up to 17 μ in diameter. They contain a karyosome and refractile granules which when stained can be distinguished as chromatoid and plastinoid. The former can be detected

in the youngest macrogametes, but plastinoid granules do not appear until later, and they are larger than the chromatoid granules.

The microgametocytes present the usual characters of this phase of parasites of the genus Eimeria. The central nucleus divides into small pieces, which distribute themselves at the surface of the parasite and develop into microgametes. The parasites are found in the epithelial cells of the uriniferous tubules, and though a single parasite is found in a cell on a few occasions two or more have been observed in a single cell. The swelling of the invaded cells exerts pressure upon those near them and these become atrophied. Obstruction of the tubules with oocysts leads to dilatation of them. The author was unable to obtain young geese for experimental infection, and experiments carried out with two young fowls failed to furnish any information as to the identity of the parasite with other coccidia occurring in birds.

CAUCHEMEZ (L.). **Un cas de coccidiose de l'épithelium intestinal chez le chien.** [A Case of Coccidiosis in the Dog.]—*Rec. Méd. Vét.* 1923. Oct. Vol. 99. No. 20. pp. 413–417. With 1 text fig.

The author has encountered a case of dysentery in a dog in which coccidia were present in large numbers in the faeces. These measured 20 to 26 μ by 14 to 17 μ. He was able to examine sections of the intestine microscopically and gives figures of some of the phases observed. He was unable to observe sporulation in the faecal material, and in consequence is unable to say whether the parasite was an Isospora, but it was probably *I. rivolta*.

BUISSON (Jean). **Sur quelques infusoires nouveaux ou peu connus parasites des mammifères.** [New or Little Known Infusoria of Mammals.]—*Ann. Parasit. Humaine et Comparée.* 1923. Aug. Vol. 1. No. 3. pp. 209–246.

It is impracticable to make a summary of this paper, but the authors résumé may be quoted as follows :—

" In the first part of this paper descriptions are given of the following parasites :—

" 1. Infusoria recently described and encountered in the intestine of the African rhinoceros and elephant, viz., *Prototapirella cristata* Buisson, 1923, *Prot. clypeata* Buiss., 1923, *Tricaudalia brumpti* Buiss., 1923, from *Rhinoceros bicornis*, and *Prototapirella elephantis* Buiss., 1923, from the intestine of *Elephas africanus*.

" 2. New Infusoria belonging to the genera *Lavierella* n.g. and *Bozasella* n.g. n.sp. and *Bozasella rhinocerotis* n.g. n.sp., both found in the intestine of *Rhinoceros bicornis*.

" 3. *Entodinium dubardi* Buiss., 1923, found in the rumen of *Capreolus capreolus* in the Department of Côte-d'Or.

" 4. A Balantidium from the caecum of *Dasyprocta aguti* from Brazil.

" Record is also made of the presence of a Balantidium in the caecum of *Xerus rutilus* in Somaliland, and also of the occurrence of an unidentified infusorian in the caecum of the Abyssinian rodent *Heterocephalus glaber*. The second portion of the paper comprises a complete revision of the known infusoria of the alimentary canal of mammals."

The paper concludes with an alphabetical list of the mammals known to harbour infusoria and an alphabetical list of the names of genera after the species and varieties.

SHEATHER (A. L.). **The Detection of Intestinal Protozoa and Mange Parasites by a Floatation Technique.**—*Jl. Comp. Path. & Therap.* 1923. Dec. Vol. 36. No. 4. pp. 266–275. With 3 text figs.

This paper is in the nature of an addendum to an earlier communication regarding the detection of parasite worm eggs in the faeces of animals by means of a floatation technique (see this *Bulletin* 1923, Nov., vol. 11, no. 3, p. 135).

It appears to be unnecessary to repeat the description of the technique in full here since, in so far as it applies to the detection of certain parasitic protozoa of the alimentary tract, it requires no modification.

The suggestion that the method might have an application wider than that of detecting parasitic worm eggs only was derived from the facts that coccidia and forage acari were frequently found in the faeces of calves in the course of investigation previously reported.

From the faeces of dogs *Isospora bigemina* (11·5 μ to 13 μ), *Isospora rivolta* (21 μ to 24 μ) and a parasite which was possibly *Isospora felis* (44 μ to 47 μ) were isolated.

From the faeces of a cat which the writer obtained from Dr. WENYON *Isospora felis* and *Isospora rivolta* were obtained in immense numbers. A kitten, which was admittedly already the host of a light infestation with *Isospora* (*rivolta ?*), was infected experimentally with the above faeces. Infection occurred, and measurement of 50 parasites indicated that only *Isospora rivolta* was present. With a view to obtaining the phases between the sporozoite and the mature gametes in sections of the intestines the kitten was destroyed immediately infection was detected. It is not known whether *Isospora felis* would have appeared in the faeces later.

Coccidiosis in the pig.—From two pigs *Eimeria debliecki* was isolated, and in one of these animals a larger parasite which varied from 23 to 30 μ was found. A curve constructed upon the measurements of the parasites found in this animal appeared to indicate that, if size is a sufficient criterion for the determination of different species, two species were present.

On one occasion a small sample of faeces from an elephant suspected of harbouring parastic worms was examined and eight coccidia were found. These range from 18·5 by 17·5 μ to 25 by 22·5 μ. Eleven coccidia ranging in size from 21 by 12 μ to 25 by 16 μ were found in the intestinal contents of a squirrel. The failure of these parasites to undergo any further development rendered it impossible to determine whether it belonged to the genus Eimeria or to the genus Isospora.

On two occasions coccidia were found to be present in the excrement of birds, a pheasant chick and a pigeon.

On a number of occasions a parasite identified by Dr. WENYON as Balantidium was found in the faeces of cattle. The parasites ranged from 75 to 112 μ in diameter.

In the diagnosis of mange the floatation technique was grafted on, so to speak, to a method of diagnosis previously published by the writer.* In the technique referred to the essence of the process was the actual boiling of the material suspected of containing mange parasites in a 10 or 20 per cent. solution of caustic potash followed by a very brief centrifuging. The sediment, mixed with a drop or two of water, was spread out thinly on a slide.

* *Jl. Compar. Path. & Therap.*, 1915. Vol. 28. pp. 64-66.

In the newer method, after centrifuging for a few seconds, the liquid is poured off and the tube is half filled with water. Sugar solution is then added until the tube is full. Mixing is effected by repeated inversion. The tube is then centrifuged for about 1½ minutes at 2,000 r.p.m.. and the parasites are collected on a cover glass in the manner described in the earlier paper.

As a point of practical value it may be noted that the risk of breakage of the tube when boiling the suspected material with caustic potash may be very largely eliminated by using a wire gauze cylinder to enclose the tube during the process.

FRANCHINI (G.). **Sur les Protozoaires des plantes.** [The Protozoa of Plants.]—*Ann. Inst. Pasteur.* 1923. Oct. Vol. 37. No. 10. pp. 879-885.

This note is a summarization of the author's investigations which have been published elsewhere.

FRANCHINI (G.). **Inoculation de flagellés d'insectes dans le latex des Euphorbes,** [The Inoculation of Flagellates derived from Insects in the Latex of Euphorbia.]—*Bull. Soc. Path. Exot.* 1923. Nov. 14. Vol. 16. No. 9. pp. 646–650.

The author gives details of experiments in which he inoculated the stems of *Euphorbia geniculata* with flagellates from the digestive tube of different flies and of Pentatomidae.

The injected parasites become leishmaniform, the plants stunted in growth, and pale in colour. The latex becomes watery.

The author suggests that the symptoms presented by the plants bear a not very distant resemblance to those caused by similar protozoa in animals.

FRANCHINI (G.). **Sur un flagellé particulier d'une Urticacée** (*Ficus benjamina*). [A Flagellate of *Ficus benjamina.*]—*Bull. Soc. Path. Exot.* 1923. Nov. 14. Vol. 16. No. 9. pp. 650–652. With 1 text fig.

The author has found flagellate, non-flagellate, and multiplication forms in stained preparations from the latex. Measurements and figures are given.

FRANCHINI (G.). **Sur un flagellé d'une Asclépiadacée** (*Araujа angustifolia*). [A Flagellate of an Asclepiad.]—*Bull. Soc. Path. Exot.* 1923. Nov. 14. Vol. 16. No. 9. pp. 652–655. With 2 text figs.

MIGONE described the discovery of *Leptomonas elmassiani* in the latex of this plant in Paraguay in 1916, and CORDERO has recorded the same thing in Uruguay. Franchini has detected the protozoa, of which he gives figures and a description, in the latex of *Araujia angustifolia* at Bologna. The plant appeared sickly.

FRANCHINI (G.). **Nouvelles recherches sur les protozoaires des plantes à latex.** [New Researches regarding the Protozoa of Euphorbia.]—*Bull. Soc. Path. Exot.* 1923. Nov. 14. Vol. 16. No. 9. pp. 655–659. With 3 text-figs.

The author describes the occurrence of trypanosomes, trypaniform and leishmaniform parasites, piroplasms, etc., in the latex of certain species of Euphorbia.

DELANOË (P.). **De la spirochétose des oies dans le Cercle des Doukkala.** [Spirochaetosis of the Goose in Doukkala.]—*Bull. Soc. Path. Exot.* 1923. Oct. 10. Vol. 16. No. 8. pp. 582–587.

In 1920 the author published an account of the occurrence of spirochaetosis in fowls in the Doukkala area, and expressed the opinion that in all probability ducks and geese were also likely to be infected.

In the present paper details are given of an outbreak of the disease among geese. Three birds, in the blood of which parasites were present in enormous numbers, were given intravenous injections on two consecutive days of novarsenobenzol Billon; the doses ranged from 2 to 4·5 cg. In each case recovery occurred. One of the birds died after apparently complete recovery from myocarditis complicated by pericarditis. The dose in centigrammes approximated to the weight of the birds in kilogrammes.

A number of fowls showed evidence of illness at the time when the cases of spirochaetoses occurred in the geese, but no spirochaetes were found in their blood. Nevertheless, after injections of novarsenobenzol improvement resulted. The author, however, believes that the birds were actually infected with spirochaetosis, and concludes that the same parasite is responsible for disease in poultry and geese, and he incriminates *Argas persicus* as the transmitting agent in both cases.

Support of this view that spirochaetosis of the goose and fowl are caused by the same organism is furnished by the fact that with blood obtained from one of the geese he was able to infect two young fowls and another goose.

Pigeons in close contact with the geese were not infected, nor did two attempts to infect pigeons by inoculation succeed. Galli-Valerio has already reported that the spirochaete of the fowl in Tunis is not inoculable to the pigeon.

DISEASES DUE TO METAZOAN PARASITES.

SWYNNERTON (C. F. M.). **The Relations of Some East African Tsetse Flies to the Flora and the Fauna.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. June 21. Vol. 17. No. 3. pp. 128–141. With 19 figs.

It is impossible to abstract a paper such as this, for it represents the results of wide and prolonged observation, and to give an adequate idea of its essence it would be necessary to reproduce it almost in full. The paper is divided into 6 sections, as follows:—1. Prefatory Remarks; 2. The Plant Succession and the Main Woodlands Divisions; 3. The Requirements of the Different Tsetses as regards Vegetation; 4. The Relations of the Different Tsetses to the Fauna and their Probable Pathogenic Importance; 5. The Reactions of the Different Tsetses to Game Destruction; 6. The Control of the Tsetses of the Morsitans group.

NEWSTEAD (R.). *Glossina Ziemanni*, **Grünberg, a Synonym of** *Glossina palpalis* **Sub-species** *Fuscipes*, **Newstead.**—*Ann. Trop. Med. & Parasit.* 1923. Dec. Vol. 17. No. 4. pp. 533–534.

GRÜNBERG described *G. ziemanni* on examination of specimens preserved in alcohol and sent from the Cameroons in 1912. Newstead has examined a male and female, and has no doubt in deciding that some of the special characters described were due to changes in coloration and other characters as a result of impurities in the alcohol used, and hat the fly is in reality *G. palpalis* sub-species *fuscipes*, Newst.

NEWSTEAD (R.). **On a New Species of** *Phlebotomus* **from Japan.**—*Ann. Trop. Med. & Parasit.* 1923. Dec. 21. Vol. 17. No. 4. pp. 531–532. With 1 text fig.

The author describes a new species, *Phlebotomus squamirostris*, received from Japan.

KIEFFER (J. J.). **Nouveaux Chironomides piqueurs habitant l'Algérie.** [New Biting Chironomides in Algeria.]—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1922. Dec. Vol. 2. No. 4. pp. 494–518. With 20 text figs.

The author describes the following new species:—

Atrichopogon meloesugans, Atrichopogon natans, Atrichopogon bilineatus, Forcipomyia seneveti, Culicoides parroti, Culcioides distigma, Culicoides foleyi, Culicoides donatieni, Culicoides kabyliensis, Culicoides saevus, Culicoides nudipennis, Dasyhelea begueti, Dasyhelea astyla, Dasyhelea longituba, Dasyhelea strigosa, Bezzia sergenti, and *Holoconops mediterraneus.*

BLACKLOCK (B.) & THOMPSON (M. G.). **A Study of the Tumbu-Fly,** *Cordylobia anthropophaga* **Grünberg, in Sierra Leone.**—*Ann. Trop. Med. & Parasit.* 1923. Dec. 21. Vol. 17. No. 4. pp. 443–510. With 4 plates and 5 text figs.

The bulk of this paper refers to the fly as a parasite of man, but a considerable section of it is devoted to the development of *C. anthropophaga* in animals and kindred points.

In natural conditions the parasite was most frequently found on black and brown wild rats. In cases in which a single larva was found the feet, genitals, tail, and axillary region were the commonest seats of invasion, but in heavily infected animals apparently there was no selection of site. Dogs also were found infected, but other animals more rarely. Fifty sheep—a species said to be attacked by the natives—were examined with negative results.

It was found to be possible to infect guinea-pigs by allowing them to walk on sand infected with the larvae.

The following animals have been recorded as hosts:—man, dog, guinea-pig, wild rat, monkey, white rat, cat, wild cat, arvicanthis, squirrel, goat, and antelope. ROUBAUD doubts the occurrence of the parasitism in the last two species. The writers of the present paper have detected it in the mongoose and chimpanzee.

Observations appear to show that animals which have lower natural temperatures are more suitable as hosts than those with higher temperatures. The authors' observations indicate that rats are

probably the natural reservoir of the virus, and the evidence shows that in both animals and man age plays an important part in the incidence of the parasitism. Young animals are more severely affected than adults.

PILLERS (A. W. N.). *Hypoderma bovis* **(de Geer) and** *H. lineatum* **(de Villiers) causing Warbles in Horses.**—*Vet. Jl.* 1923. Oct. Vol. 79. No. 10. pp. 329–331. With 2 text figs.

Seven larvae taken from horses were found to be *H. bovis* (5) and *H. lineatum* (2). The parasites were obtained from horses at Abbeville, St. Omer, Monaghan, Burscough, Leighton Buzzard and Lechlade. In the case at Lechlade there were ten warbles present along the animal's back and one on the cheek wall. Only one was examined. It was found to be *H. bovis*.

WAHL (R. O.). **Combating Sheep-Maggot Flies.**—*Jl. Dept. Agric. Union of South Africa.* 1923. Nov. Vol. 7. No. 5. pp. 428–432. With 1 plate.

Articles dealing with the progress of the work of investigation in connexion with the control of sheep-maggot flies and blow flies will be published from time to time. The present paper deals with trapping and describes and illustrates a convenient trap.

During the season 1922-23, December to March, the catches in fourteen traps were collected every three weeks and the total number of flies of all species caught was 1,085,000. A single large trap in one period of three weeks caught 47,000 flies.

BLACKLOCK (B.). **A Pyrrhocorid Bug capable of biting Man.**—*Ann. Trop. Med. & Parasit.* 1923. Oct. 13 Vol. 17. No. 3. pp. 337–345. With 1 text fig.

This paper contains an account of *Dysdercus superstitiosus*, the chief food of which is derived from plants—notably cotton—but which has been recorded on a number of occasions as feeding on dead animals or reptiles. No evidence was obtained that the bug was capable of withdrawing blood. Flagellate parasites were found in the bug.

SENEVET (G.). **Contribution à l'étude des Ixodidés (ix° Note). Espèces trouvées en Algérie sur les Bovins, pendant les mois d'été.** [The Species of Ixodidae found on Bovines in Algeria during the Summer. 9th Note.]—*Arch. Inst. Pasteur Afrique du Nord.* 1922. Dec. Vol. 2. No. 4. pp. 519–528. With 4 maps.

The observations recorded in this paper were made in the course of investigations regarding the occurrence of piroplasmosis of bovines in Northern Africa. The total number of ticks examined was 2,472 and these were obtained from 121 different localities. They were collected during July, August and September, 1921.

The bulk of the paper is made up of tabular statements of the number and species of ticks found in the different areas and sketch maps showing the distribution of the more important ones, namely, *Margaropus calcaratus, Rhipicephalus bursa, Hyalomma aegyptium* (in which group the author places both varieties *aegyptum* and *impressum*), and *Hyalomma mauritanicum* (recently described). Hyalomma and Rhipicephalus are the most widely distributed throughout both the littoral and the highlands of the interior. *Margaropus calcaratus*, on the other hand, appears to have a comparatively localized distribution which is confined to the coast area.

DELANOË (P.). **De l'infestation des rats de la ville de Mazagan par la puce chique de la poule** (*Sarcopsylla gallinacea* **W., 1875).** [An Infestation of Rats in Mazagan by *Sarcopsylla gallinacea*.]—*Bull. Soc. Path. Exot.* 1923. Oct. 10. Vol. 16. No. 8. pp. 592–593.

The parasitization of rats by *Sarcopsylla gallinacea* has previously been reported by TIRABOSCHI from Italy (1903). Delanoë finds that even when the parasite is at its maximum the percentage of rats infested scarcely exceeded 2, and more than 3 or 4 parasites were not found on any one animal save in one instance when 54 were found on a single rat. The chigoes are found only round the snout and the mouth parts are so deeply embedded that it is usually impossible to remove the parasite entire.

DELANOË (P.) & LELAURIN (A. P.). **Infestation massive d'un élevage de poulets par la puce chique:** *Sarcopsylla gallinacea* **Westwood, 1875.** [Heavy Infestation of a Poultry Farm with the Chigoe, *Sarcopsylla gallinacea*, Westw., 1875.]—*Bull. Soc. Path. Exot.* 1923. Oct. 10. Vol. 16. No. 8. pp. 593–594.

The authors describe a very severe infestation of birds imported for poultry breeding from France.

SALM (A. J.). **Sur quelques parasites du dindon dans les îles de la Sonde.** [Some Parasites of the Turkey in the Sunda Islands.]—*Bull. Soc. Path. Exot.* 1923. Oct. 10. Vol. 16. No. 8. pp. 594–598. With 2 text figs.

The author has encountered *Goniodes stylifer* Nitzsch, *Lipeurus polytrapezius* Nitzsch, and *Megninia bifidus* Nitzsch.

CAMERON (A. E.). **Notes on Buffalo: Anatomy, Pathological Conditions, and Parasites.**—*Vet. Jl.* 1923. Oct. Vol. 79. No. 10. pp. 331–336.

The author's observations were made while slaughter was being carried out of a number of buffalos at the National Buffalo Park, Wainwright. The slaughterings were rendered necessary to retard the rapid increase in the herd, which had risen from 700 in 1907 to over 7,000 at the present time.

Anatomical details regarding the mouth and teeth, skeletal structures and some of the internal organs are given.

Only three pathological conditions are mentioned :—a teratoma, a lipoma, and arteriosclerosis of the posterior aorta in a very old bull.

Hypoderma larvae were found in practically all the animals. They were encountered in the oesophagus, pillars of the diaphragm, between the spleen and the stomach, in the spinal canal and in the hide.

Setaria labiato-papillosa was found in the peritoneal cavity of every buffalo examined, and in one of them thirty specimens were found. The parasites appeared to be harmful. In many animals adhesions were noted and parasites were entangled in them. Dead parasites become enclosed in fibrous tissue; the centres become caseous and afterwards hard. Such encased parasites may be found free in the peritoneal cavity.

Fasciola magna. The presence of this parasite was denoted by inky black areas on the surface of the liver.

Haemonchus ostertagi was found in the fourth stomach and duodenum. These appear to be responsible for the same disease as in cattle. [Presumably the author refers to *Ostertagia ostertagi.*]

Dictyocaulus filaria. This parasite was found in several cases ; the number per animal was small, about a dozen. Their presence was associated with emphysema and "hard areas which suggested tuberculosis when felt from the outside."

About 3 per cent. of the animals harboured a Monezia (probably *planissimus*). An unidentified oesophagostomine was found.

Sarcocystis was found in the pillars of the diaphragm and under the endocardium in many cases. Those in the heart were small and required special searching for their detection.

No external parasites of any kind were found.

ICHIKAWA (Koichi). [**Ueber die endemische Hamaturie bei Rindern mit Blasentumor in der Shinchiku-Gegend auf der Insel Formosa, mit besonderer Berücksichtigung des bei diesen Fällen entdeckten Schistosomum. II Mitteilung.** [The Endemic Haematuria in Cattle with Bladder Tumours on the Island of Formosa and the Schistosome discovered in these Cases.]—*Ni. Byor. Gak. K.* Tokyo. 1921. Vol. 11. pp. 460–462. [Summarized in *Japan Jl. Med. Sciences.* Tokyo. 1922. Vol. 1. No. 1. p. 63.]

In a preliminary communication the author reported on the endemic haematuria of cattle with bladder tumours in Formosa. In further investigations he found adult *Schistosoma japonicum* in two cases ; these flukes showed no morphological differences when compared with those previously described from Formosa and Japan. In five other cases he did not find any schistosomes or their eggs in the tissues, although pathological changes similar to those of schistosomiasis were present.

As to the histogenesis of the bladder tumours, the author is of opinion that the tumour is caused not by the direct irritation of the parasite's eggs on the mucosa, but by the irritation of the decomposed urine. The haematuria here is thus of a different nature from that found in Egyptian bilharziasis, which is due to the action of the eggs deposited in the submucosa.

The writer thinks this parasite a sub-species of *Schistosoma japonicum*, but reserves a definite judgment.

MAPLESTONE (P. A.) & SOUTHWELL (T.). **Notes on Australian Cestodes, No. VII.**—*Ann. Trop. Med. & Parasit.* 1923. Oct. 13. Vol. 17. No. 3. pp. 317–331. With 10 text figs.

In this paper three new species and one new genus are described. Further details of the morphology of *Monopylidium macracanthum* and *Linstowia echidnae* are included.

New species. *Bothridium ornatum* n.sp. found on several occasions in carpet snakes.

Monopylidium fieldingi n.sp. found in the intestine of the Butcher bird.

Paramoniezia suis n.g., n.sp. One specimen was found in a wild pig. Queensland.

JOYEUX (Ch.). **Recherches sur la faune helminthologique Africaine.** [African Helminths.]—*Arch. Inst. Pasteur de Tunis.* 1923. July Vol. 12. No. 2. pp. 119–167. With 17 text figs. [To be continued.]

In this paper the author describes :—

1. Cestodes in birds ; 2. Cestodes in mammals ; 3. Cestodes in Reptiles ; 4. Cestodes in Batrachians. The paper concludes with an extensive bibliography.

SOUTHWELL (T.) & ADLER (S.). **A Note on** *Ophiotaenia punica* **(Cholodovski, 1908), La Rue, 1911.**—*Ann. Trop. Med. & Parasit.* 1923. Oct. 13. Vol. 17. No. 3. pp. 333–335. With 3 text figs.

This paper contains a detailed description of this parasite, which was first encountered in a dog by CHOLODOVSKI (1908). HALL, RANSOM, and LA RUE on the grounds of its morphological characters thought that the true host of the parasite was a snake. In 1922 Southwell recorded its occurrence in a Malayan palm civet.

The present paper is the first record of its occurrence in a snake, *Causus rhombeatus.*

CILENTO (R. W.). **Possibilities in the Transmission of** *Onchocerca gibsoni.*—*Med. Jl. Australia.* 1923. Apr. 21. Vol. 1. Year 10. No. 16. pp. 445–446.

Observations have so far failed to elucidate the problem of the transmission of *Onchocerca gibsoni,* and the author therefore brings forward certain facts which, while not in any way furnishing proof as to the manner of transmission, may help to provide a solution. The information was supplied by a meat inspector.

At a sale of animals a Tabanid fly was observed to alight on a cow and to attach itself for about 5 minutes. Careful examination of the site of the bite failed to reveal the slightest trace of a nodule. A month later the animal was carefully examined and at the place where the fly had

attached itself and which had been marked there was palpable a distinct nodule as large as a rice grain. No further information is given regarding this lesion.

A bullock was carefully examined and found to be free from nodules. In a pouch in the skin there were placed the heads of 6 Tabanid flies in which unidentified nematodes were found in the neighbourhood of the proboscis. A month later two nodules as large as rice grains were found at the site of the operation. Fortnightly examinations were made and one of the nodules attained the size of an almond. This was dissected out and in the opinion of the meat inspector it was an onchocercal nodule. The bullock was subsequently sold to a butcher and four worm nests were discovered within an inch and a half of the place where the experimental insertion of the flies heads had taken place. No other nodules were found.

On another occasion the same inspector observed a tabanus to be biting a bullock. Examination of the animal at the time failed to reveal the presence of any nodules. The bullock was set aside and was not slaughtered until a month later. When the skin was removed the inspector found at the place where the tabanus had bitten a coiled worm seven inches in length in a condition of commencing encapsulation. The worm was identified as *Onchocerca.*

The Tabanid flies concerned in the second observation were *Tabanus germanicus* and *Tabanus aprepes.*

NEVEU-LEMAIRE (M.). **Presence d'***Ascaris ovis* **chez le Chevreuil** (*Capreolus capreolus*). [The Presence of *Ascaris ovis* in the Roebuck.]—*Ann. Parasit. Humaine et Comparée.* 1923. Aug. Vol. 1. No. 3. pp. 265–268. With 1 text fig.

The author reviews briefly the records previously published regarding this rare parasite, and gives a description of the single specimen found by him. The author makes a short survey of the occurrence of Ascarides in ruminants and concludes that up to the present only two species, *Ascaris vitulorum* Goeze, 1782, and *Ascaris ovis* Rudolphi, 1819, are known.

GEDOELST (L.). **Le genre** *Metastrongylus* **Molin, 1861.** [The Genus *Metastrongylus* Molin, 1861.]—*Bull. Soc. Path. Exot.* 1923. Oct. 10. Vol. 16. No. 8. pp. 622–630. With 4 text figs.

As a result of examination of parasites from the bronchi of pigs from the Congo, Gedoelst finds that genus is not represented by *Metastrongylus elongatus* and *M. brevivaginatus* as is usually the case in Europe.

A description of the generic characters is given together with a detailed account of the two species mentioned above. There is added a description of another species, *Metastrongylus salmi,* which the author believes to be identical with the parasite found in the lungs of pigs in Java by SALM.

Comparing the species, Gedoelst arrives at the conclusion that a subdivision of the genus Metastrongylus is warranted and suggest Metastrongylus which has for its type *M. elongatus* (Dujardin, 1845), and *Choerostrongylus* which has for its type *M. brevivaginatus* (Railliet & Henry, 1907). *M. Salmi* belongs to the second of these.

SMIT (H. J.) & NOTOSOEDIRO (R.). **Nog eenige Strongyliden van het Paard op Java. III.** [Some Equine Strongyles from Java.]—*Nederl.-Ind. Bl. v. Diergeneesk. en Dierenteelt.* Vol. 34. No. 6 [undated]. pp. 446–455. With 5 figs.

This paper contains descriptions of five parasites: *Cylicostomum bogoriense*, n.sp., *Cylicostomum elongatum*, *Cylicostomum* (*Cylicocyclus*) *insigne*, *Cylicostomum barbatum*, n.sp., and *Cylicostomum* (*Cylicostephanus*) *poculatum*, and does not lend itself to abstraction. It should be consulted in the original by those interested.

DRABBLE (J.). **The Kidney Worm of Hogs in New South Wales, *Sclerostomum renium*, n.sp.**—*Jl. Comp. Path. & Therap.* 1923. Dec. Vol. 36. No. 4. pp. 217–230. With 9 text figs.

The author gives a detailed and illustrated account of the kidney worm occurring in hogs in New South Wales and shows that the parasite is probably distinct from *Stephanurus dentatus* (*Scelerostoma pinguiclao*).

BISHOPP (F. C.), COOK (F. C.), PARMAN (D. C.) & LAAKE (E. W.). **Progress Report of Investigations Relating to Repellants, Attractants, and Larvicides for the Screw-Worm and Other Flies.**—*Jl. Econom. Entomol.* 1923. Apr. Vol. 16. No. 2. pp. 222–224.

GEDOELST (L.). **Note sur la larve du gastrophilus haemorrhoidalis et description de la larve d'une nouvelle espèce africaine.** [Note on the Larva of Gastrophilus haemorrhoidalis and a Description of the Larva of a New Species from Africa.—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Aug. Vol. 1. No. 3. pp. 269–275. With 3 text figs.

NÖLLER (W.) & WAGNER (O.). **Der Wasserfrosch als weiter zwischenwirt eines Trematoden von Ente und Huhn.** [The Frog as Intermediate Host of a Trematode of the Duck and Fowl.]—*Berlin. Tier. Woch.* 1923. Nov. 1. Vol. 39. No. 44. pp. 463–464.

SMIT (H. T.) & NOTOSOEDIRO (R.). **Nog eenige Strongyliden van het Paard op Java IV.** [Some Strongyles of the Horse in Java.]—*Nederl.-Ind. Bl. v. Diergeneesk. en Dierent.* Vol. 35. No. 1. pp. 28–36. With 5 figs.

BACTERIAL DISEASES.

BURNET (Et.). **Quelques faits relatifs à la possibilité de vacciner la chèvre contre le** *Micrococcus melitensis.* [The Possibility of vaccinating Goats against *Micrococcus melitensis.*]—*Arch. Inst. Pasteur de Tunis.* 1923. July. Vol. 12. No. 2. pp. 205–212.

While undulant fever is widely spread among human beings, there is not the necessity of general vaccination against it. Since the disease is almost invariably contracted as a result of infection from goats the desirability of attempting to vaccinate these animals is obvious. The author has attempted to do this, but he has to admit that he has had negative results only. It would appear that the methods which have been successful in man have proved quite unsuccessful in the goat. Young healthy Maltese and Arab goats were used. They were given doses of 900 million and 2,700 million organisms killed at 60° C., at an interval of 7 days. A month later they were given a test inoculation, and at the same time control goats were inoculated. Agglutination tests and blood cultures showed no differences between the vaccinated and the unvaccinated goats.

EVANS (Alice C.). **Experimental Abortion in a Cow produced by Inoculation with** *Bacterium melitensis.*—*Public Health Reports.* 1923. April 20. pp. 825–826.

This short paper is a preliminary note recording briefly an experiment which gives further evidence of the close relationship between the bacillus of contagious abortion and *Bacterium melitensis.*

A pregnant heifer was inoculated with a suspension of a culture obtained from the blood of a case of Malta fever some five months previously. Seven weeks after inoculation the heifer aborted a foetus at about 5½ months. *Bacterium melitensis* was recovered from the stomach contents, contents of the small intestine, peritoneal fluid of the foetus and from the colostrum. The recovered strain was shown to be serologically identical with the strain used for inoculation, which is unmistakably distinguishable by the agglutination absorption test from the typical *B. abortus.*

The agglutination titre of the serum was taken before inoculation and at subsequent intervals of about two weeks; the tests were made with the homologous strain and with a strain of the bacillus of abortion.

It is convenient to reproduce the tabular statement of the results of the agglutination tests.

Date.	Antigen	Titres.
Feb. 9 1923 (before inoc.)	*B. melitensis*	Partial 1 : 10
	B. abortus	1 : 20
Feb. 20 1923	*B. melitensis*	1 : 320 (partial 1 : 640).
March 7 1923	*B. melitensis*	1 : 160 (partial 1 : 320).
	B. abortus	1 : 320
March 22 1923	*B. melitensis*	1 : 320
	B. abortus	1 : 320
March 27 1923 (1 day after aborted)	*B. melitensis*	1 : 320
	B. abortus	1 : 320

The author states that the result given with *B. abortus* on Feb. 9th is not considered as indicating infection, because normal cows serum occasionally contains agglutinins for this organism in small quantities.

SHEATHER (A. L.). **The Occurrence of the Abortion Bacillus in the Milk of Infected Cows.**—*Jl. Comp. Path. & Therap.* 1923. Dec. Vol. 36. No. 4. pp. 255–266.

The author has had the opportunity of examining samples of milk from fifty cows, all of which had been proved to be infected by the agglutination test. The technique in each case was to inject a pair of guinea-pigs, one subcutaneously and one intraperitoneally, each with sediment obtained by centrifuging 10 cc. of milk. The blood of these animals was tested by agglutination at intervals of 3, 6, and, in some cases, 9 weeks after inoculation. In many cases the bacillus was recovered in artificial culture from reacting guinea-pigs.

The results showed that 17 of the samples (or 34 per cent.) contained the bacillus of abortion. As a secondary object experiments were carried out with a view to establishing the relationship—if any—between the agglutinating power of the whey, separated from the milk by clotting with rennet extract, and the blood serum.

The parallel tests carried out with whey and blood serum indicated that while the agglutination titre of the whey was invariably lower than that of the serum, there was no constant relationship between the two. In 14 per cent. of cases the whey failed to cause any agglutination.

SANDERSON (Everett S.) & RETTGER (Leo F.). **Paths of Infection by *Bacterium abortus* in Rabbits, Guinea-pigs and Mice.**—*Jl. Infect. Dis.* 1923. Mar. Vol. 32. No. 3. pp. 181–186.

The authors bring forward experimental evidence indicating that guinea-pigs, rabbits and mice can be infected with the bacillus of contagious abortion by way of the mouth and vagina or urethra.

COMBIESCO (D.) **Recherches sur le mécanisme de l'infection charbonneuse. Action du sang total, du plasma et du sérum actif et inactif, de cheval, de lapin, de mouton et d'homme sur la bactéridie charbonneuse.** [The Mechanism of Infection in Anthrax. The Action of Whole Blood, Plasma, and Serum of the Horse, Rabbit, Sheep and Man on the Bacillus of Anthrax.]—*C. R. Soc. Biol.* 1923. July 21. Vol. 89. No. 25. pp. 634–636.

Previous investigators have found that there is no relationship between the resistance offered by certain animals to infection with anthrax and the bacteriolytic power of their serum for the bacillus of that disease, and, further, that the serum of some susceptible animals possesses marked bacteriolytic powers. In the experiments in which plasma was used this was obtained at first in paraffined tubes, using a paraffined needle. Plasma could be kept liquid for 8 to 10 hours in this way. Subsequently it was ascertained that identical results were found where plasma was obtained by means of sodium citrate, and as this simplified technique the paraffin method was discarded.

With serum or plasma from each species a series of culture experiments were performed. In the first two or three drops of an emulsion of anthrax culture were added to 10 cc. of whole blood, plasma, and serum active and inactivated. In the second series the blood of rabbits dead of anthrax was used.

The tubes were incubated at body temperature and they were examined at intervals varying from 30 minutes to 5 hours afterwards. In the blood tube the bacilli were found for the most part in the interior of leucocytes and partly digested, but in some cases the leucocytes contained encapsuled bacilli and themselves showed evidence of degeneration. Abundant cultures were obtained using this material as seed, and by inoculation the blood cultures proved fatal to rabbits. In the plasma tubes encapsulation of the organisms occurred very rapidly, and multiplication resulting in the formation of long filaments took place. Abundant subcultures were obtained and the cultures were fatal to rabbits within the usual period. Inactivated serum behaved in the same way as plasma.

Active serum exercised a marked bacteriolytic action. After 5 hours no bacteria could be discovered microscopically and cultures yielded a few colonies only. Rabbits failed to become infected, possibly because of the small dose and possibly because of a reduction in virulence.

If a larger amount—4 to 6 drops—of emulsion was used as seed material the appearance of smears from the plasma, active and inactive serum were identical, and in the tubes of whole blood there were many free robust-looking bacilli provided with capsules.

The tubes which were inoculated with 2 drops of blood from a rabbit dead of anthrax yielded different results. Smears from the blood tubes showed that none of the bacilli had been ingested by leucocytes and that free multiplication was going on. In the serum (active and inactivated) and the plasma tubes marked multiplication occurred.

Experiments with blood, plasma and serum from rabbits yielded the same results.

With sheep blood it was found that the leucocytes were unable to ingest the bacilli. Plasma and serum exercised no inhibitory action.

With human blood and serum intermediate results were obtained

COMBIESCO (D.) **Recherches sur le mécanisme de l'infection charbonneuse. Action du sang total, du plasma et du sérum de cheval et de bœuf hyperimmunisés, sur la bactéridie charbonneuse.** [The Mechanism of Anthrax Infection. Action of Whole Blood, Plasma and Serum from the Horse and from Hyperimmunized Bovines on the Bacillus of Anthrax.]—*C. R. Soc. Biol.* 1923. July 21. Vol. 89. No. 25. pp. 637-639.

The author finds that tubes of normal horse or ox serum and plasma inoculated with a drop or two of blood from a rabbit dead of anthrax yield good cultures and that there is no destruction of the bacilli. With the blood of a horse hyperimmunized against anthrax a different result is obtained. The encapsulated bacilli are ingested by the leucocytes, and while the central substance becomes paler, the polychromatic capsule persists until capsules alone can be found in the leucocytes. Plasma has no destructive effect. Active serum exercises a strong bacteriolytic effect.

With ox blood different results are obtained. In the whole blood there is no evidence of phagocytosis, nor was any observed in the plasma tubes. Hyperimmune ox serum behaved like ordinary serum.

These results indicate that at least in vitro the serum of a hyperimmune horse is more active than that of hyperimmune ox. At the same time they lend support to the view that the capsule is a secretion of the bacterial cell itself.

COMBIESCO (D.). **Recherches sur le mécanisme de l'infection charbonneuse. Rôle de la peau dans l'infection charbonneuse.** [The Mechanism of Anthrax Infection. The Parts played by the Skin.] —*C. R. Soc. Biol.* 1923. July 21. Vol. 89. No. 25. pp. 640–642.

The facts emerging from the author's previous results are (1) the rapidity with which the bacillus accommodates itself to an albuminous medium—capsules are developed within a few minutes; (2) encapsuled organisms are not ingested by leucoyctes; (3) if the amount of seed material is large some of the organisms become encapsuled and some are ingested.

With regard to the part played by the skin in anthrax infection Combiesco states that he is able to concur in the results of BESREDKA and BALTEANO, but with this reservation, that intraperitoneal, intravenous, and subcutaneous inoculations fail to set up the disease unless the dose exceeds a certain amount. This the author explains on the grounds of his in vitro experiments; the number injected exceeds that which can be dealt with by the leucocytes, encapsulation and multiplication follow with the death of the animal.

By operating through an opening in the abdominal wall the author has injected rabbits into the lungs, liver, and spleen direct with anthrax cultures with 0·1 cc. Death has followed. He concludes that other organs are very susceptible to anthrax.

He then asks whether the skin is really a specially susceptible organ. He thinks it more natural to suppose that the skin plays a mechanical part. He thinks that when a subcutaneous inoculation is made some of the bacteria remain in the epidermis and dermis. Here the phagocytary reaction is prolonged and the bacteria encapsule themselves quickly. Death takes place.

The author has repeated BALTEANO'S experiment of enclosing sealed tubes containing cultures of anthrax in the abdominal cavity and afterwards breaking them, but he has modified the technique by sealing only one end and closing the other with absorbent wool. When the tubes are broken after some hours, death occurs and in a series of experiments the changes in the tube have been examined. It has been found that nearer the open end of the tube the bacilli are phagocyted, but that in the deeper parts encapsulation of the bacilli has occurred, and these, when scattered into the peritoneum, multiply and death takes place.

Instead of introducing such tubes into the peritoneum they have been placed under the skin. Phagocytosis is delayed. The bacilli become encapsuled and death occurs. He thus concludes that the skin is not specially sensitive, but that introduction into the skin delays phagocytsis, allows encapsulation to take place, and the bacilli thus rendered more resistant are able to multiply and cause death.

BROCQ-ROUSSEU & URBAIN. **Cuti-vaccination et cuti-immunité anticharbonneuse chez le cheval.** [Cuti-Vaccination and Cuti-Immunity against Anthrax in the Horse.]—*C. R. Soc. Biol.* 1923. June 2. Vol. 89. No. 19. pp. 20–22.

The authors place on record an attempt to immunize a horse against anthrax by intracutaneous vaccination. They point out that owing

to the susceptibility of the horse to anthrax they have proceeded very cautiously. They hope to be able to accelerate the process of conferring protection in further experiments.

From a tabular statement given it appears that the first inoculation, which was given intracutaneously on the side of the neck on Feb. 21st, was $\frac{1}{20}$ cc. of 1st vaccine. Subsequently inoculations were carried out at intervals of a week and the doses given in succession were $\frac{1}{4}$ cc. 1st vaccine, $\frac{1}{8}$ cc. 2nd vaccine, $\frac{1}{4}$ cc. 2nd vaccine, 1 cc. 2nd vaccine. The last dose of vaccine was given on 21st March. On 28th March $\frac{1}{10}$ cc. of virulent culture was given and subsequently at intervals of a week $\frac{1}{4}$ cc., 1 cc., 2 cc., 2 cc., and 5 cc. of virulent culture were given. The whole of the doses were administered intracutaneously by scarification, save the second dose of 2 cc., which was administered subcutaneously. On no occasion was any reaction produced, other than a painless or slightly painful oedema, which disappeared within two or three days.

During the course of the experiment the animal only showed a single brief rise of temperature to 38·8° C., after the last dose of culture had been given.

On five occasions tests were made with the animal's serum by the deviation of the complement, agglutination, and precipitin reactions, and in only one instance was a positive reaction obtained. This was given by the deviation of the complement test eight days after the last inoculation.

To test the prophylactic power of the serum guinea-pigs were injected with 1, 1·5 and 2 cc. of the horse's serum, and after 24 hours were inoculated with $\frac{1}{8}$ cc. of 2nd vaccine, a dose which proved fatal to controls. The guinea-pigs died.

The authors conclude: 1. That it is possible to vaccinate horses against anthrax by the cutaneous path, 2. The immunity obtained exists without the production of antibodies, of which there is a negligible amount in the serum. 3. The serum of a protected animal does not protect guinea-pigs against anthrax.

BROCQ-ROUSSEU & URBAIN. **Vaccination contre le charbon par le voie cutanée chez le cheval.** [The Cutaneous Path of Vaccination against Anthrax in the Horse.]—*C. R. Soc. Biol.* 1923. July 21. Vol. 89. No. 25. pp. 487–488.

In this short note the authors describe a more rapid method of immunizing horses against anthrax than that recorded in their earlier communication.

In this case only two doses were used. The first cutaneous vaccination was 0·25 cc. " 1st vaccine " and the seat of inoculation was the side of the neck. There was no reaction. A week later 0·25 cc. of " 2nd vaccine " was inoculated intracutaneously on the same side of the neck. There was no reaction.

After an interval of ten days an intradermic inoculation of 0·5 cc. of virulent culture was given. The culture was sufficiently virulent to kill a rabbit by intracutaneous inoculation in a dose of $\frac{1}{10000}$ cc.

The day following the inoculation there was an area of hot, painful oedema and some enlargement of the lymphatics. This disappeared in the course of three days. There was no elevation of temperature. No evidence of the presence of agglutinins, precipitins or sensitizer could be found in the serum 10 days after the virulent inoculation. The serum failed to protect guinea-pigs.

CALMETTE (A.). **Les vaccinations microbiennes par voie buccale.** [The Administration of Bacterial Vaccines per os.].—*Ann. Inst. Pasteur.* 1923. Oct. Vol. 37. No. 10. pp. 900–920.

This paper is a critical review of the experiments and observations which have been made in connexion with the oral administration of bacterial vaccines. The paper deals with vaccines for use in diseases of the human subject, and only a reference amounting to a few lines is made to a disease of the lower animals, viz., rinderpest.

Calmette's conclusions may be summarized as follows : In the case of typhoid and paratyphoid fevers observation and experiment have yielded evidence that the oral administration of vaccines is of some value, but further work is necessary before the efficacy of the method is determined. A point which must be borne in mind in this connexion is that while oral administration is generally held to be free from objection on the score of being harmless, this freedom from objection is not absolute.

Experiments with animals have shown that in order to cause the formation of antibodies by the oral administration of vaccines large doses must be administered on several occasions and that the quantity given must " approximate to the toxic dose."

Blind confidence is not to be placed in the method in the present state of knowledge.

LE LOUET (G.) & BROUDIN (L.). **Anémie pernicieuse progressive des bovidés de Cochinchine. Note préliminaire.** [Progressive Pernicious Anaemia of Bovines in Cochin China. Preliminary Note.]—*Bull. Soc. Path. Exot.* 1923. Oct. 10. Vol. 16. No. 8. pp. 575–580.

The symptoms are not striking ; cases are characterized merely by progressive wasting until a condition of actual emaciation is reached. No bacteria or protozoa have ever been detected in the blood microscopically, but in cultures from the blood there has been obtained in some cases an organism which the authors believe is the cause of the condition.

The bacillus resembles the paratyphoid-enteriditis group of bacteria in general, but possesses some special distinguishing characters. It is stated that the bacillus has been isolated from the blood of two animals suffering from the disease, but the authors do not indicate the number of cases in which the organism has not been recovered from the blood. The organism occurs in culture—it has not been seen in the blood—in the form of a small rod measuring 1·3 μ in length, by 0·5 to 0·6 μ in thickness. The ends are rounded. In both there is a tendency to form filaments, and forms from 12–15 μ may be seen. Flagella are demonstrable.

The bacillus is gram negative, is a facultative anaerobe, and the optimum temperature for growth is 37° C.

On agar it forms translucent colonies about the size of a pin's head which rapidly increase in size and coalesce, forming a thick layer which is at first white, but in the course of a week acquires a pale yellow tint.

Gelatin is not liquefied. On potato a thick yellowish brown growth develops in 48 to 72 hours.

Growth is very rapid in Martin's broth, producing turbidity. Subsequently a delicate whitish scum forms on the surface. This scum breaks up easily on agitation of the tube, and sinks to the bottom.

Good growth is obtained in milk, and the medium is not coagulated. It acquires a pale brown tint.

Lactose, maltose, mannite, saccharose, and glucose were all used in fermentation tests, but with none of them was any fermentation produced.

The bacillus does not sporulate. Adult animals appear to be more susceptible than young ones, and, as already mentioned, progressive wasting is the most pronounced symptom. During the course of the disease constipation and diarrhoea may alternate with each other. This period may last for two months or longer, and there is a progressive decline in the number of red corpuscles in the blood, until the figure may be as low as three million per cubic millimetre. The temperature is irregular and oscillates between 38° and 40° C. The authors do not state what is the percentage mortality, but in cases in which recovery takes place the period of convalescence is very prolonged.

Small laboratory animals and monkeys are insusceptible to inoculation with the bacillus. A bull inoculated intravenously with culture is said to have developed the symptoms of the natural disease, but the duration of the illness is not given. On the 23rd day after inoculation cultures made with blood yielded the organism under investigation in a condition of purity. In a second case which was produced experimentally the bacillus was recovered from the faeces on the 8th day.

The serum of infected animals contains agglutinin for the organism. The bacillus was tested by agglutination with anti-Eberth, anti-paratyphoid A and B, anti-Flexner, anti-Shiga, and anti-Saigon sera, but in all cases negative results were obtained. The titre of the sera of naturally infected animals ranges from $\frac{1}{80}$ to $\frac{1}{240}$. Such sera do not agglutinate *B. coli*.

The sera of the experimentally infected calves possessed titres of $\frac{1}{1000}$ and $\frac{1}{1200}$.

The sera of normal animals do not cause any agglutination.

SOWERBY (M. H.). **Bovine Tuberculosis in the Bombay Presidency.**—*Indian Jl. Med. Res.* 1923. Apr. Vol. 10. No. 4. pp. 1169–1171.

Lesions were found in the lungs, liver and udder of a seven-year-old Indian cow.

Acid-fast bacilli were found by microscopic examination.

No animal experiments were carried out.

DISEASES DUE TO FILTERABLE VIRUSES.

STANDFUSZ (R.). **Zur Erkennung der ansteckenden Blutarmut des Pferdes durch den Kaninchenimpfversuch.** [The Diagnosis of Contagious Anaemia of Equines by the Inoculation of Rabbits.]—*Berlin. Tierartz. Wochenschr.* 1923. Oct. 11. Vol. 39. No. 41. pp. 431–433.

In this short paper details are given of a number of experiments in which rabbits were inoculated with serum from cases of equine infectious anaemia. Blood from the rabbits was subjected to a blood count daily. In 31 out of 34 animals there occurred a marked fall in the number of red corpuscles which lasted for at least several days. In two there was only a slight decline in the number and in one no drop was observed. The fall generally occurred in from 4 to 7 days after inoculation, but occasionally it was even later.

The average reduction in number amounted to 1½ million in 24 of the rabbits, in four from 1 to 1½ million and in three 2 million. Controls which were not inoculated and controls inoculated with normal serum were included in the experiments.

APPERMANN & LAUTERBACH. **Die Diagnose der infektiösen Anämie des Pferdes mit Hilfe des Kaninchens.** [The Diagnosis of Equine Infectious Anaemia by means of Rabbits.]—*Berlin. Tierarzt. Wochenschr.* 1923. Nov. 15–22. Vol. 39. No. 46–47. pp.487–488.

The authors state that on numerous occasions they have inoculated rabbits with blood from cases of equine infectious anaemia, and that although clinical symptoms do not make their appearance, examination of the blood reveals the presence of blood lesions similar to those occurring in naturally infected horses. They have further found that the virus can be transmitted back again from the rabbit to the horse.

Indications have been obtained that agglutination of corpuscles from diseased animals with serum from other infected animals may assist in the diagnosis of the disease.

MERK (M.). **Untersuchungen über fortschreitende, bösartige Blutarmut des Pferdes, unter besonderer Berücksichtigung der Erkrankung in der Ostschweiz.** [Pernicious Anaemia in Equines, with Special Reference to its Occurrence in Eastern Switzerland.]—*Schweiz. Arch. f. Tierheilk.* 1923. Oct. Vol. 55. No. 10. pp. 469–506.

In some districts in Switzerland pernicious anaemia of equines occurs with twice or three times the frequency observed before the war.

The majority of cases are seen in animals from 6 to 12 years of age. Young horses do not appear to be particularly susceptible.

Figures obtained from insurance societies showed that 500 cases occurred during a period of five years among 39,159 horses.

Postmortem examination of cases of pernicious anaemia reveals the presence of subcutaneous oedema of the body and limbs, and possibly also of the larynx, the base of the heart and the auriculo-ventricular valves. The muscular masses are pale red in colour and have a watery appearance. In very severe cases the liver may be two or three times the normal size, and it is of a reddish or greyish brown tint.

The spleen is usually enlarged and in some cases shows dark red tumour-like swellings.

The heart shows sub-endocardial haemorrhages, and in cases of long standing the organ is dilated. The cortex of the kidneys shows haemorrhagic spots about the size of pins' heads.

The large serous membranes may show subperitoneal haemorrhages. Congestion and reddening of the bone marrows of the long bones are not constantly observed.

Microscopically the most severe alterations are to be found in the liver. In the centre of the lobules there are, as a rule, not recognizable liver cells. The capillaries are dilated, and lymphocyte infiltrations are found.

The kidneys show extensive round-celled infiltrations, slight endothelial desquamation, and compression of the glomeruli. Infarct formation is a not uncommon occurrence. In sections from heart-muscle, degeneration of the muscle fibres, small round-celled infiltrations and capillary congestion are seen.

The author failed to transmit the disease from horse to horse by inoculation, but it must be noted that only a very few experiments of this kind were carried out.

The paper concludes with a list of published papers, but it appears that only literature in German is mentioned.

BIGOT. **Au sujet de l'anémie infectieuse du cheval au Maroc.** [Equine Pernicious Anaemia in Morocco.]—*Bull. Soc. Path. Exot.* 1923. Nov. 14. Vol. 16. No. 9. pp. 634–635.

The author presents a brief communication to the Society, and promises a detailed report later.

The disease occurs in an acute or even per-acute and a chronic form, and most frequently in damp or marshy areas. The virulence of the infection appears to vary in different localities. Animals which survive an attack not infrequently die during the succeeding cold weather.

Although approximately a thousand mules have been under observation, no case has ever been observed in this animal, nor has it been found possible to transmit the disease to the mule experimentally. Horses and donkeys have been inoculated successfully. Mere contact is not sufficient to cause the disease to spread, nor has it been found possible to transmit it by contaminating the food of healthy animals with excrement from sick ones.

There appears to be little information to give regarding the lesions. In a very few per-acute cases, very severe congestion of the anterior lobes of the lungs has been observed. In spite of the colour of the faeces passed, which suggests the presence of haemoglobin, no lesions have been detected in the mucous membrane of the intestine.

MINETT (F. C.). **The Cultivation of the Rinderpest Virus** *in vitro*.—*Jl. Comp. Path. & Therap.* 1923. Dec. Vol. 36. No. 4. pp. 205–216.

The author's experiments have been carried out on the basis of those published by BOYNTON in 1914 (see this *Bulletin*, Vol. 2, p. 185), and he comments on the facts that since that date he has not been able to discover any records of attempts to verify BOYNTON'S results, and that though BOYNTON stated that further experiments were being carried out, no records have been published. Minett's experiments have been carried out at the Serum Institute, Abbassieh, Cairo, and he has used Cyprus bulls for his test inoculations.

A brief summary of BOYNTON'S technique is given, and this Minett has followed closely. The medium used was that devised by BASS and JOHNS for the cultivation of the malaria parasites, which was said by BOYNTON to give the best results. This medium was defibrinated blood to which a 33 per cent. solution of glucose was added in the proportion of 0·1 cc. to 10 cc. Seed material in the form of defibrinated virulent blood was added in varying amounts in different experiments, but always in quantities of less than 1 cc., and finally a layer of sterile paraffin oil was placed on the top. Tubes were incubated at 39–40° C. and transplants of amounts which varied from 0·5 cc. to 0·85 cc. were carried out at intervals of three days.

Seven experiments of this nature were carried out, but in only one of the seven was a positive result obtained, with material derived from the tubes of the third generation. Minett admits that the mixing of the contents of the tubes before each of the transplantations and before taking the sample for inoculation was not thorough, and that therefore the experiment cannot be held to indicate more than the survival of the virus in the subcultures.

In another experiment designed to supply information as to the survival of the virus in vitro at body temperature under certain conditions, a positive result was obtained with a tube of defibrinated blood glucose medium which had been incubated at body temperature for thirteen days.

In three experiments attempts were made to demonstrate multiplication of the virus in culture tubes of the first generation. In each case after thorough shaking a bull was inoculated with a certainly non-infective dose of virus. After incubation another bull was inoculated with the same or a smaller dose. Had infection occurred in the second animal multiplication would have been indicated. No positive results were obtained.

In view of the probability that the virus of rinderpest is present in the circulating blood largely in the leucocytes, an attempt was made to prepare a medium suitable for cultivating the virus which should be particularly rich in leucocytes. The medium was prepared on the same lines as the chicken broth used by LEWIS and LEWIS, but veal was substituted for chicken. No positive results were obtained. Discussing his own results and dealing with BOYNTON'S at some length Minett believes that BOYNTON'S apparently positive results were due to survival of virus, that survival being favoured by transference from tube to tube, and errors in estimating dilution as a result of imperfect mixing. Minett has not been able to confirm any of BOYNTON'S results.

GREGORES (A. E.). **La Peste Bovina en el Brasil.** [Rinderpest in Brazil.]—*Revista de Medicina Veternaria.* 1923. June-July. Vol. 6. Nos. 9–10. pp. 527–568. [To be continued.]

This paper contains an account of the outbreak and methods employed in controlling it.

GIRARD (Georges). **Paralysie mortelle observée chez un chien au cours d'un traitement antirabique prolongé.** [Fatal Paralysis in a Dog subjected to Prolonged Antirabic Treatment.]—*Bull. Soc. Path. Exot.* 1923. Oct. 10. Vol. 16. No. 8. pp. 599–601.

It is notable that paralysis is an exceptional occurrence in the dog, as a result of antirabic treatment. In Japan 30,000 dogs have been treated without a case occurring during the last two years.

Paralysis has been observed in man and in rabbits during the treatment. But protective inoculation in the dog is carried out on rather different lines from those of inoculation in the human subject. In the dog, the treatment is "economic"; the number of doses is very small, and there may indeed be a single injection only.

According to REMLINGER, immunization by a few large doses has advantages over prolonged treatment with small doses. The immunity is not less effective and paralysis is less likely to occur.

The author records two cases which appear to support this view.

Two fox-terriers which were bitten by a rabid dog were kept under observation. They were subjected to the same course of treatment as is applied to the human subject. They received two daily doses during the first week and one dose daily during the following two weeks, of 1 cc. of dried spinal cord from Nos. 7 to 0.

One of the dogs, in which treatment was begun three days after it was bitten, was afforded complete protection.

The second fox-terrier was not subjected to treatment until five days after it was bitten. On the 18th day of treatment it showed symptoms of excitement and a tendency to bite anyone approaching it. Paralysis appeared in the hind legs and extended until all four limbs were involved. The paralysis, however, was not complete, as the dog could drag itself about its kennel. There was no salivation, no change in the voice, spasms of the pharynx, nor periods of fury. The condition of the animal remained practically constant for a fortnight, but there was progressive emaciation, and death occurred on the 15th day of illness.

Postmortem examination failed to reveal anything special, and rabbits inoculated subdurally from the medulla remained healthy.

The fact that these rabbits survived appears to negative a diagnosis of rabies, unless it be admitted either that the original virus had become attenuated by the treatment, or that both of the rabbits inoculated possessed a natural immunity. The author therefore thinks that the paralysis was independent of the rabic virus and was similar to that observed in human beings under treatment.

BESNOIT (C.) & ROBIN (V.). **Sur la variole de la chèvre.** [Variola in the Goat.]—*Rev. Vét.* 1923. Nov. Vol. 75. No. 11. pp. 685–695.

The authors' observations indicate that variola of the goat is enzootic in Southern France, where the goat population is not inconsiderable, and they quote a number of cases in support of this view.

They have observed an outbreak in a small herd used for drawing children's carts in the public gardens at Toulouse. The whole of the animals, about a dozen in number, became affected at about the same time. The source of the infection could not be traced with any certainty. Lesions were found on the head and udder only. In the former they were confined to the margins of the lips. On the udder the lesions were most severe at the base of the teats. Here there were large confluent pustules exactly like those occurring in cow-pox. The natural course of the disease appeared to be about three weeks. Spontaneous recovery occurred, and it was hastened by the application of iodised glycerin. No scars were left when healing was complete. In two cases acute mastitis involving the loss of two quarters occurred. The possible explanation of this was that, owing to the condition of the teats, the quarters were not properly milked out.

With a view to determining the specific nature of the disease a calf, two lambs, rabbits, guinea-pigs and man were inoculated. The results indicated that variola in the goat is a specific entity which is closely allied to sheep-pox.

MISCELLANEOUS.

SENEVET (G.). **L'emploi de la machine à écrire pour l'établissement des formules leucocytaires.** [The Use of the Typewriter in calculating Leucocyte Formulae.]—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1922. Dec. Vol. 2. No. 4. pp. 622–624.

For those who have cause to make enumeration of leucocytes frequently the author has devised a simple procedure which, with very little practice, makes it possible to prepare a leucocyte formula with accuracy, rapidly. A typewriter is placed beside the microscope on the side opposite to that at which the milled heads controlling the mechanical stage are set. The marginal stops of the machine are placed so that 50 symbols may be made per line. Letters on the machine are selected to indicate the different types of cell, *e.g.*, L represents small lymphocytes, M, intermediate mononuclears, G, large mononuclears, E, eosiniphiles, and B, basophiles. Two or three fingers rest on the keys the letters of which most frequently recur in the formulae, and it is only necessary to move the hand occasionally to mark the less frequently occurring types. Polynuclear leucocytes are not indicated by a letter but by the use of the space bar, which records a gap on the paper, and thus facilitates the reading of the result obtained.

As there are 50 symbols, including spaces on each line, and each space represents a polynuclear leucocyte the total of these is readily ascertained. Using this method the author states that in a film containing large numbers of leucocytes he has been able to construct a formula on 150 cells in three minutes.

The advantages claimed are : that the eye is applied to the microscope throughout, thus avoiding the fatigue of changes of accommodation necessitated when the formula has to be constructed by making marks with a pencil, and that if interruption occurs it is only necessary

to type the name of the patient whose blood is under examination, or other identification of the slide, and the counting can be continued later. The record is permanent.

The author especially contrasts his method with that in which beads are dropped into boxes representing the different types. The disadvantages of this method are obvious.

D'HERELLE (F.). **Le Bactériophage.** [Bacteriophage—d'Herelle's Phenomenon.]—*Rev. Path. Comp.* 1923. Oct. 5. Vol. 23. No. 238. pp. 596–620.

In this paper the author summarizes the present status of knowledge regarding the phenomenon. In the first section the possible explanations are considered. These fall with two groups—hypotheses based upon the existence of abnormal autolysins and those based upon the existence of a normal bacterial principle. d'Herelle concludes that all theories which aim at explaining the phenomenon on the grounds either that there is some principle, whether chemical, enzyme or catalyser, which is foreign to the bacterium or that it is due to abnormal metabolism of the organism brought about by some chemical agent, are, in view of the effect taking place in series, inadmissible because they are mathematically absurd.

The only theory which fits in with the facts is that the effect is due to a filterable virus which parasitizes the bacteria.

In the second section of the paper d'Herelle considers the nature of the Bacteriophage, and comes to the conclusion that all the characters possessed by the Bacteriophage indicate that it is a living virus and that it is composed of corpuscles measuring 20 $\mu\mu$ in diameter. These corpuscles possess their own individuality, which is quite independent of the bacterium destroyed. They multiply in a hetergenous medium, and must therefore be capable of assimilating. Their virulence is capable of variation, and finally they are capable of adjusting themselves to adverse conditions.

The third section of the paper is devoted to a discussion of the manner in which the Bacteriophage acts.

Three hypotheses are possible: that the Bacteriophage could produce lytic enzymes, that it could itself act as an enzyme, or that it could provoke the formation of autolytic enzymes by the bacteria themselves.

He concludes that the Bacteriophage is a living entity which is parasitic on the bacteria, and entering their bodies causes their destruction.

The paper concludes with an extensive bibliography.

IYENGAR (B. D.). **Cutaneous Haemorrhage in Cattle.**—*Vet. Jl.* 1923. Oct. Vol. 79. No. 10. pp. 351.

The author records the occurrence of two cases in bullocks which showed haemorrhage from the skin. It was said that haemorrhage would occur at one site for an hour or so and then cease, appearing elsewhere on the body. It was further said that at times the ground on which the animals stood was soaked with blood. A definite diagnosis was not made, but the author considers that *Filaria multipapillosa* was possibly the cause.

CANHAM (A. S.). **Ophthalmia in Cattle.**—*Vet. Jl.* 1923. Nov. Vol. 79. No. 11. pp. 389–396.

Ophthalmia is scarcely a correct name since in the majority of cases there is keratitis only, but it is true that some cases do develop into true ophthalmia. There are indications that the disease is regional in its distribution, and, further, that the distribution is very irregular. Of neighbouring farms one may be affected badly and the other quite free. It also appears to be clear that the condition has a seasonal incidence ; far more cases occur during the rainy season than during dry weather, but it must not be understood that cases do not occur at all during the latter season.

The nature of the soil does not appear to influence the distribution of the disease ; cases occur with about equal frequency among cattle grazing in damp places, and those on dry veld. The virulence of the disease varies from year to year. Imported cattle are more susceptible than indigenous breeds, but the susceptibility of crosses between these is low. Age appears to play little part in determining susceptibility to infection, although possibly yearlings are more susceptible than adults.

Neither the cause nor the method of spread is known. Attempts at direct infection with materials obtained on swabs from diseased eyes and efforts to set up the disease by the closest possible contact between diseased and healthy animals failed. Similarly negative results were obtained in experiments in which the bodies of flies mashed up in salt solution were applied to the eyes. Ticks, moths, and worms have at different times been suggested as being causally connected with the disease, but up to the present the actual cause has not been established.

Treatment is not always successful, although a host of drugs and dressings has been tried. It is said to be an advantage to keep changing the dressing every three or four days.

DODD (Sydney). **Cancer of the Ear of Sheep. A Contribution to the Knowledge of Chronic Irritation as a Factor in the Causation of Cancer in the Lower Animals.**—*Jl. Comp. Path. & Therap.* 1923. Dec. Vol. 36. No. 4. pp. 231–242. With 3 text figs.

This paper is, as its sub-title indicates, a contribution to the knowledge of chronic irritation as a factor in the causation of cancer in lower animals. Injuries to the ear are very commonly seen in sheep in Australia. In many cases the lesion arises as a result of ear punching or cutting as a mark of ownership. There are, however, other causes. In such cases the injury may be acute and heal promptly; healing may be sluggish with possible complications, such as being blown by flies, and kept in a constant state of irritation by the sheep rubbing or scratching. The sore may become chronic ; and, finally, chronic irritation may lead to the formation of true epitheliomata which become metastatic.

The proportions of cases in which these various results of injury occur are not known, but it is certain that in the very great majority the injury heals promptly.

The phase of chronic irritation may, and probably does, persist for some time, but once the growth acquires malignant characters, progress of the condition is rapid.

There is no information in a general way regarding the subsequent history of such cases, for affected sheep, being of no commercial value, are promptly destroyed.

The author had the opportunity of keeping one case under observation. The animal was four years old, and was selected by the owner as a " good specimen " of the condition. The apex of the ear had disappeared, but near the tip there was a black-looking mass of scab, measuring 3 in. by 2 in. in area. Under the scab there was a slightly purulent granulomatous mass, with ulcerating edges. The auricula was moderately swollen and slightly thickened near the lesion. The skin was firmly attached to the underlying tissues. During the first three months of observation the lesion underwent little change, save a slight increase in extent. There did not appear to be any great amount of pain, and appetite and general condition were maintained.

During the next two months the lesion extended and the base of the ear became involved. Bleeding occurred whenever the animal shook its head to obtain relief from the flies.

By the first week in August the lesion had developed into a large cauliflower-like mass, as large as a man's fist. The animal, in spite of a maintained appetite, began to lose flesh, and wool began to come out, leaving bare patches. The growth was deeply fissured and maggots and larvae could be removed from the fissures with difficulty.

A lymphatic gland lying about midway between the atlas and the point of the shoulder became enlarged and hard, but was apparently painless. This rapidly increased in size, and in a fortnight its size increased from that of a cherry to that of a golf ball.

The sheep was killed a month later, when the gland was as large as a tennis ball and very firm. On section this gland was found to have a consistence approaching soft horn. The cut surface was greyish white and granular-looking. Near the centre was a caseous-looking area about half an inch in diameter. There was no evidence of inflammation. The prescapular gland at the same side was about as large as a walnut, and on palpation was found to contain a number of hard centres as large as peas.

No other lesions were discoverable in the body.

Sections from various parts of the growth on the ear showed a similar histological picture. There were large masses of stratified squamous epithelium with a rather scanty stroma. Cornification had gone on extensively, and the masses were heavily impregnated with eleidin. At the base of the ear the condition was at a less advanced stage ; the whole of the original structures had not been completely destroyed, but masses of stratified squamous epithelium could be seen burrowing into the tissues in a rather scanty stroma.

In the cervical gland lesion nearly the whole of the epithelium had become cornified, but some of the masses showed two or three layers of large epithelial cells. The stroma was scanty and none of the original gland structure could be seen. The caseous material in the centre contained numerous epithelial cells, but no bacteria were discovered. In the prescapular gland small islands and strands of epithelium were present, surrounded by a stroma of young fibrous connective tissue. The epithelium appeared to be actively penetrating and destroying the gland tissue.

It is not known how long the original chronic lesion of the ear had been in existence, but the author thinks that it had already become malignant when the case came under observation.

Two attempts were made to transmit the growth by implanting fragments about the size of lentils from the cervical gland lesion. The grafts increased to the size of walnuts and then decreased in size and disappeared. No importance is attached to these results, for the reason that the number of animals used was too small, and the subsequent examination of the lesion showed that it was in all probability quite unsuitable for the purpose. Proper treatment might prevent the lesion passing beyond the stage of simple inflammation, but such treatment is impossible in Australia. Amputation of the ear might prevent metastasis, but such procedure is illegal as destroying the marks of ownership. That cancer of the ear destroys the marks is no answer to this, as the cancer might be given as the reason for the absence of an ear by an individual in unlawful possession of a sheep.

Apart from the case which has been referred to in some detail, the author received materials from 47 other cases, of which 32 showed evidence of malignance following on chronic inflammation.

The evidence that the malignancy is the result of the chronic irritation is circumstantial, but is nevertheless strong.

TROPICAL DISEASES BUREAU.

TROPICAL VETERINARY BULLETIN.

VOL. 12.] May 31, 1924. [No. 2.

DISEASES DUE TO PROTOZOAN PARASITES.

HOARE (Cecil A.). **An Experimental Study of the Sheep-Trypanosome (*T. melophagium* Flu, 1908), and its Transmission by the Sheep-Ked (*Melophagus ovinus* L.).**—*Parasitology*, 1923. Nov. Vol. 15. No. 4. pp. 365–424. With 5 plates and 5 text figs.

The present paper deals *in extenso* with the author's investigations regarding the occurrence of a trypanosome in sheep in England.

An earlier and less detailed publication has already been noted in this *Bulletin* (Vol. 10, no. 4, Nov. 1922, pp. 107–108).

The present paper is divided into 12 parts dealing with the following aspects of the work: 1. Historical survey; 2. Anatomy and biology of the Sheep Ked; 3. Technique employed; 4. The Incidence of the parasite in the Sheep; 5. Transmission of the parasite; 6. *T. melophagium* in the vertebrate host; 7. *T. melophagium* in the invertebrate host; 8. Cultivation of *T. melophagium*; 9. Animal experiments; 10. Affinities of *T. melophagium;* 11. Summary; and 12. Appendix.

It is impracticable to deal adequately with this long paper in an abstract, and for detailed information the original must be consulted. It is convenient to reproduce the author's summary.

Trypanosoma melophagium Flu, 1908, is a parasite of European domestic sheep (*Ovis aries* L.) in the blood of which it occurs in very scanty numbers and can be detected by the cultural method. In England it has been found in 80 per cent. of the sheep examined. The infection is of fairly short duration and does not produce an immunity in sheep, since the latter can easily be re-infected. In all probability *T. melophagium* produces no pathological effect in sheep, and is incapable of infecting laboratory animals.

Morphologically the sheep trypanosome is closely allied to the cattle trypanosome, *T. theileri*.

The intermediate host of *T. melophagium* is the sheep-ked, *Melophagus ovinus* L., in the alimentary canal of which it passes through a definite cycle of development ending in the production of infective forms (metacyclic trypanosomes) in the hind-gut of the insect.

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The mode of transmission is contaminative, the sheep acquiring the infection by ingesting the ked. Infection of sheep did not result from the bite of the ked, through abrasions of the skin, or from inoculation of cultures of the trypanosome.

T. melophagium is easily cultivated at 30° C. Its evolution in cultures is similar to that in the invertebrate host.

BRUMPT (E.). **Description de deux trypanosomes nouveaux : *T. sergenti* et *T. parroti* du *Discoglossus pictus*.** [Two New Trypanosomes, *T. sergenti* and *T. parroti* of *Discoglossus pictus*.]—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Oct. Vol. 1. No. 4. pp. 337–341. With 2 text figs.

The author describes two recognisably distinct trypanosomes found in the blood of a young specimen of *Discoglossus pictus* in Algeria. Trypanosomes have not been observed previously in the blood of this species.

T. sergenti has a somewhat pyriform body, the rounded end of which is posterior. There is a poorly developed undulating membrane and a fairly long free flagellum. The over-all length ranges from 30 to 50 μ, and the breadth from 6–12 μ. The nucleus is oval in shape and lies sometimes transversely and sometimes longitudinally. There is generally a clear space anterior to and close to the nucleus. The blepharoplast is subterminal in stained preparations and oval in shape. It is placed transversely across the termination of the flagellum. Attempts at cultivation in artificial media have so far failed.

T. parroti. This is a very motile trypanosome, but its motility involves little or no translation. The parasite is very variable in size. Six fixed specimens measured from 54 to 78 μ in length. The cytoplasm is either hyalin or shows fine purple granules. The parasite is very fragile. The nucleus is composed of a collection of granules, is oval in shape and longitudinally placed. The blepharoplast is transversely elongated or sometimes reniform. Multiplication forms have not been seen on either species.

VAN SACEGHEM (R.). **Le pouvoir empêchant dans les trypanosomiases.** [Inhibition in Trypanosomiasis.]—*Bull. Soc. Path. Exot.* 1923. Dec. 12. Vol. 16. No. 10. pp. 733–735.

By his expression " le pouvoir empêchant " the author designates a property developed in animals which has an inhibitory action upon the multiplication of trypanosomes *in vivo*. The property tends to change pathogenic trypanosomes into commensals. It is developed with especial rapidity in wild animals, and in some cases in domesticated animals.

In trypanosomiasis a kind of balance is often struck between the animal and the parasite with the result that while the animal has to all intents and purposes recovered, the recovery is not complete in that the trypanosomes persist although causing no actual disease. This condition differs markedly from that found in most bacterial diseases. In some species the inhibitory power is developed very slowly, as for example in cattle infected with *T. congolense*. By suitable medicinal treatment infected cattle can be kept alive sufficiently long for the development of the inhibitory power to take place.

Even in animals in which a radical cure appears to have been obtained it not infrequently happens that even after a lapse of years the persistence of trypanosomes can be established.

KÜHNE (M.). **Die Beschälseuche in der Altmark 1922-1923.** [Dourine in Altmark 1922–23.]—*Arch. f. Wissen. u. Prakt. Tierheilk.* 1923. Vol. 50. No. 3. pp. 283–291.

The author gives details of an extensive outbreak of dourine during the years 1922–1923.

It is interesting to note that the author has seen a case of dourine in a foal eighteen months old. In this case infection could not have been contracted by coitus. It does not appear that a definite diagnosis was arrived at. He thinks that the transmission was by " contact."

LEYNEN (E.). **La durina.** [Dourine.]—*Revist. de Hig. y. Sanidad Pecuarias.* 1924. Jan. Vol. 14. No. 1. pp. 1–14. With 12 text figs.

This paper appears to be in the nature of a review of the existing knowledge regarding the clinical aspects of the disease.

BAROTTE & BALOZET. **Application pratique au Maroc de la déviation du complément dans le diagnostic de la dourine.** [The Practical Application of the Complement Fixation Test to the Diagnosis of Dourine in Morocco.]—*Bull. Soc. Path. Exot.* 1924. Jan. 9. Vol. 17. No. 1. pp. 27–32.

Trypanosome extracts prepared by WATSON'S technique are used as antigen. It is important to bleed the animals when the blood invasion is at its maximum. This, the authors find, is about the 40th hour after inoculation, but there is some variation. The authors have found that 15 per 1,000 is a satisfactory strength of citrate solution for mixing with the blood prior to centrifuging for the collection of the trypanosomes. There need be no fear of using an excess of this. The centrifuging should not be carried out at a greater rate than 1,200.

It was found that collection of the trypanosomes from the supernatant liquid was facilitated by placing the tubes in an ice chest for 12 hours. As a result of agglomeration they were readily collected by centrifuging.

The antigen was found to be devoid of any anticomplementary property. The authors find that the test is, so to speak, a generic one, and not specific. Its value for diagnosis of dourine in the donkey requires further investigation.

BALOZET. **Contribution à l'étude des réactions de fixation dans la dourine.** [Fixation of the Complement in the Diagnosis of Dourine.]—*Bull. Soc. Path. Exot.* 1924. Jan. 9. Vol. 17. No. 1. pp. 23–27.

In this paper the author describes experiments in which the value of a number of antigens, prepared in different ways, was tested.

Alcoholic extracts of lymphatic glands, heart, liver and oedematous liquid from the abdomen of a dog infected with dourine have been tried. The actual method of carrying out the test is that described by CALMETTE and MASSOL in connection with complement fixation tests for tuberculosis; that is to say, the only factor which is varied is the complement, which has been titrated for the haemolytic system beforehand. A great difficulty was encountered in that even normal dog serum possesses a high anti-complementary titre.

None of the antigens yielded clearly positive results.

KNOWLES (R. H.). **The Formol-Gel Test as applied to Camels affected with** *Trypanosoma soudanense.*—*Jl. Comp. Path. & Therap.* 1924. Mar. Vol. 37. No. 1. pp. 37–44. With 1 text fig.

This test depends upon changes ranging from simple opalescence to gelation taking place in the serum of animals infected with certain diseases upon the addition to it of a small quantity of formalin. The test may be carried out in two ways :—

1. Tube test. Four drops of commercial formalin are added to 1 cc. of suspected serum and mixed thoroughly. The results are read at intervals from 1 to 96 hours afterwards.

2. Slide test. This is a slight modification of the technique employed by FOX and MACKIE in the diagnosis of kala azar. These authors simply placed a drop of serum on a slide and inverted this over a watch glass containing a few drops of formalin. As the reaction with camel serum takes longer three drops of serum were employed, so as to avoid desiccation. In this case observations were carried out every ten minutes. It is advisable to take especial care in obtaining the serum so that it may be as clear as possible. Camel serum is almost colourless and can, with care, be obtained almost as clear as water.

In a tabular statement the author shows the results obtained with the sera of 7 trypanosome infected camels, 12 healthy camels, 2 bulls, and 2 horses. In all the infected camels there was distinct opalescence by the second hour and more or less gelation by the 12th hour. The reaction was obtained irrespective of the presence in or absence of trypanosomes from the blood.

The serum of one of the normal camels yielded doubtful opacity from the 12th hour onwards.

The two bulls were apparently uninfected and were included as a kind of control to HORNBY'S observations. The serum of neither showed any opalescence up to 96 hours. The serum of one of the horses showed gelation at 24 hours, and the sera of both were completely gelated at 48 hours. Comparative tests were made using 2 drops and 4 drops of formalin to 1 cc., and the results were clearly in favour of 4 drops being used.

By means of the slide test it was found that opalescence made its appearance in about 10 minutes and that gelation began at about 50 minutes. Normal sera were negative to the test. The author concludes that the test is reliable and that it will be of value in the purchase of camels.

Results of experiments with " Bayer 205 " are to be published later.

MIGONE (L. E.) & OSUNA (T.). **Tratamento do "Mal de cadeiras" dos equideos pelo novo producto Bayer "205."** [The Treatment of "Mal de cadeiras" of Equines by means of the New Product Bayer 205.]—1° *Congresso Nac. Med. Vet. Brazil.* 1922. Sept. Rio de Janeiro. pp. 35–37.

The authors recommend cattle owners to learn how to use the microscope for the prompt and certain diagnosis of Mal de caderas.

Isolation must be practised directly a case is detected. Bayer 205 should be injected intravenously, as by subcutaneous injection inflammation is set up. Healthy animals which have to pass through infected areas should be injected with a protective dose of 2 gm. The curative treatment comprises doses of 2, 3, and 4 gm. at intervals of eight days.

The drug should be given as a 10 per cent. solution in physiological salt solution.

Questions to which answers are still required are :—How long does the immunity conferred by an injection last ? ; Is it absolutely necessary to give three doses to effect a cure ? ; Does the serum of cured animals possess any curative properties ?

DOUWES (J. B.). **De behandeling van Surra bij Herkauwers met Bayer 205.** [Treatment of Surra in Ruminants with "Bayer 205."] —*Nederl.-Indische Bladen v. Diergeneesk. en Dierenteelt.* Vol. 35. No. 1. pp. 1–19. [No date. ? 1923.]

The author records that he has treated eleven buffaloes, diagnosed as suffering from surra, with "Bayer 205" in Java. Each animal received a single intravenous injection of 3 or 5 grammes (in a 5 per cent. solution) ; and all were put in dark, fly-free stalls and kept under observation—with daily microscopic examination of the blood—for a month after treatment. The results are summarized in eleven tables occupying six and a half pages, and were briefly as follows : four animals died shortly after receiving the injection, though there was nothing to show that the treatment caused death, whilst the other seven animals made an apparently complete recovery.

An unsatisfactory feature of these cases is that, with a single exception, none of the buffaloes showed trypanosomes in its blood before treatment. As the preliminary blood-examinations were all negative, the diagnosis of surra was therefore made from symptoms only. The blood of all "cured" animals remained negative after treatment, as long as they were under observation ; but in view of the negative results before treatment, it is obvious that there is no direct evidence here to prove that the drug can cure an infection with *T. evansi* in the buffalo. The single exception was case V, which showed many trypanosomes in its blood before treatment, but none afterwards.

The author describes and discusses the symptoms regarded as characteristic of surra by previous writers, and shows that his cases—apart from the negative blood-examinations—fall under the clinical definition of the disease. But he acknowledges that his observations are inconclusive, and is fully alive to the fact that the buffalo is a difficult animal to deal with, as it may acquire a chronic infection with *T. evansi,* and apparently recover from surra without treatment.

Two other noteworthy points are recorded. First, the author notes that, in a systematic investigation of the blood of [presumably healthy]

buffaloes in adjoining places he found "innumerable carriers of the parasite" [*i.e.*, animals showing *T. evansi* in their blood—a fact difficult to reconcile with the complete absence of trypanosomes from nearly all the animals treated]. Secondly, he mentions the case of another buffalo—not included in the series—which showed similar symptoms. It showed no trypanosomes in its blood, however, and was first treated with atoxyl and then with "Bayer 205." Next day it died; but inoculation of its blood (taken before death) and cerebrospinal fluid into dogs produced no infections in these animals. [Such an experiment is obviously incapable of straightforward interpretation.]

In conclusion it is stated that three Bengal oxen were also treated with "Bayer 205." Surra was previously diagnosed in all of these by blood examination, but they showed no other symptoms except a high temperature. After a single injection of 5 grammes their blood remained negative for a period of one month. [No other details are recorded.]

Toxic effects referable to the drug were not observed in any of the animals treated.*

FOURNEAU (E.), NAVARRO-MARTIN (A.) & TRÉFOUEL (M. & Mme.). **Les dérivés de l'acide phenylarsinique (arsenic pentavalent) dans le traitement des Trypanosomiases et des Spirilloses expérimentales. Relation entre l'action thérapeutique des acides arsiniques aromatiques et leur constitution.** [The Derivatives of Phenylarsenic Acid in the Treatment of Experimental Trypanosomiasis and Spirilloses. The Relationship between the Therapeutic Action of the Aromatic Arsenic Acids and their Constitution.]—*Rev. Gen. Méd. Vét.* 1923. June. Vol. 37. No. 6. pp. 551–617.

A paper of this magnitude which contains multitudes of detailed observations does not lend itself to brief summarization, and must be read in the original by those interested. The author's general conclusions may be given as follows:—

The amine radicle in the para or meta position effects a reduction in toxicity. It also increases the parasiticidal action of the phenylarsenic acid in these positions. "The ortho position is always very bad."

A second amine radicle attached in the para position still further reduces toxicity, but in view of the rapid elimination of the drug by the urine the diamine compound exerts a very fleeting effect.

The addition of a third amine radicle increases toxicity and reduces the therapeutic action.

The inclusion of an hydroxyl radicle produces a more marked effect than the inclusion of an amine radicle. The position of the group is of less importance than in the case of the latter. The para position is not the most favourable, and the ortho position is bad when it is the sole group introduced. It is good, however, when there is a para amine group.

The product which has yielded the best results is 4—amino—2 oxyphenyl arsenic acid.

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

DERVISH (J.) & LAIGRET (J.). **Contribution à l'étude des modes de disparition des Trypanosomes des souris sous l'action de divers médicaments actifs : émétique, 189, 205 Bayer.** [The Manner in which certain Drugs (Emetic, 189 and Bayer 205) cause the Disappearance of Trypanosomes from Infected Mice.]—*Bull. Soc. Path. Exot.* 1923. Dec. 12. Vol. 16. No. 10. pp. 770–781. With 1 text fig.

In this paper the authors record the results obtained in the treatment of mice infected with *T. brucei, T. equiperdum, T. evansi, T. rhodesiense, T. lanfranchii* and *T. pecaudi.* All the strains regularly caused death in 4 to 6 days.

Experiments have been carried out with Bayer 205, emetic, and 189 (sodium oxyaminophenylarsenate).

Bayer 205.—Three samples of this drug have been tested under exactly parallel conditions, and have yielded discordant results.

In the case of two of the samples doses of less than four milligrammes failed to effect sterilization with regularity. The toxic dose of these samples was 13 mg.

The third sample was far more efficacious, since 0·1 mg. was found to effect a permanent cure in all the mice treated. This sample was slightly more toxic than the other two. A dose of 9 or 10 mg. caused death within 27 hours, and 13 mg. in four hours. The chemotherapeutic coefficient of this sample was $\frac{1}{90}$, as compared with $\frac{1}{3}$ (approx.) of the other two.

In unstained preparations of the blood of treated animals trypanosomes show no obvious alteration until some twelve hours after the drug had been administered. At about this time the parasites begin to lose their motility and to decrease in numbers. The average period required for the complete removal of trypanosomes from the circulation was 26 hours, but there has been a variation of some hours with different trypanosomes used.

The authors state that they have found a dose of 3 mg. to be effective as a protection for a period of about a fortnight. [They do not specify with which sample of 205 this result was obtained, but from the context it would appear that these results were obtained with the inferior ones.]

Animals injected with 1 mg. or more of the third sample were refractory up to 50 days. Animals cured of one type of infection with this drug resisted re-infection with the same and other parasites.

Immunity only exceptionally followed doses of less than 1 mg.

Morphological changes resulting from the action of the drugs.—The parasites tend to become rounded, to lose their flagellum and undulating membrane and to assume a leishmaniform shape. At the same time they show evidence of degeneration by the appearance either of granules or vacuoles in their cytoplasm or nucleus.

Multiplication is also affected by the drugs. Sometimes there is simply a reduction in the number of dividing forms, and at other times abnormal dividing forms are encountered. Sometimes the abnormal rounded forms appear to be in a phase which suggests that the power of division has been retained to some extent.

The early appearance of granular degeneration appears to be characteristic of the action of 205. With 189 and emetic only a few such forms are seen and these make their appearance much later.

The appearance of rounded forms soon after injection appears to be a typical result caused by emetic. With this drug practically all

the trypanosomes assume this shape. Rounded forms are also found after treatment with 189, but they are not so numerous.

Vacuolation appears after the granular degeneration, and it is most pronounced after treatment with 205.

Bayer 205 appears to stimulate multiplication for about two hours, but shortly afterwards dividing forms become more and more scanty. The authors have never detected the forms described by German authors in which division has taken place save that the resulting parasites remain attached to each other at the posterior end.

Neither emetic nor 189 appeared to have any influence upon dividing forms.

Some further details regarding the action of Bayer 205 upon *T. gambiense* are added to the paper by MESNIL. Of six guineapigs treated, three received 2 doses of 4 cg. of 205. Two of these recovered and one died of an intercurrent disease. The remaining three were treated with 4 and 5 cg., but at a later stage of infection died, but it appeared that death was actually due to the drug.

Three dogs were also inoculated, two were treated with 50 cg., and both recovered as a result of the single dose. The third dog was kept as a control.

DOYLE (T. M.). **The Occurrence of Blue Bodies as a Developmental Stage of** *Theileria mutans.*—*Jl. Comp. Path. & Therap.* 1924. Mar. Vol. 37. No. 1. pp. 18–27.

In this paper the author discusses the question of the occurrence of "blue-bodies" in the lymphatic glands of animals infected with *Theileria mutans* and allied organisms and supplies reasons for the failure to find these earlier.

The possibility of *mutans* infection being actually infection with *Theileria parva* is considered and the conclusion is arrived at that the evidence is against such an identity. *Theileria parva* appears to be limited to Africa south of the equator, while *Theileria mutans* has a wide distribution. Doyle is of the opinion that Egyptian fever, the theileriosis occurring in the Sudan, and that occurring in the Transcaucasus and along the Mediterranean littoral in general are one and the same, and are due to *Theileria mutans.*

The materials used in the investigation have been derived from Cyprus bulls imported for the Serum Institute in Cairo, serum-making bulls, smears prepared from blood and gland juice received from all parts of Egypt and also from Sudanese cattle.

Practically every Cyprus bull imported is infected with *Theileria mutans,* and the infection in the immense majority of cases is a pure one. It would appear that the recrudescence of the infection in these animals is due to the voyage and the damp hot climate during the summer months. It has been observed that recrudescences are always more frequent during the summer and also that during these months the period of fever is of longer duration.

The author is of the opinion that practically all Egyptian cattle harbour *Theileria mutans,* but in only about 30 per cent. of animals does the simultaneous inoculation against rinderpest, to which the animals are subjected, cause a recrudescence of the Theileria infection.

Blue bodies were found in about 7 per cent. of gland smears from Cyprus animals, but they were never detected in gland smears from infected Egyptian animals.

In Doyle's opinion the form of parasite found in the red corpuscles depends upon the severity of the attack. In chronic cases 90 per cent. of the parasites are ring-shaped, while in very acute cases practically all the parasites are bacillary. True cross-shaped forms have not been found in either acute or chronic cases.

While BRUMPT, DONATIEN and others have found blue bodies in the circulating blood in *mutans* infections, the author has not detected them there, nor has MASON, save on one occasion. For many years MASON also failed to find them in gland smears.

In all cases in which blue bodies were found in gland smears during life a thorough search was made in the internal organs when the animal was bled out for rinderpest virus. The animals were bled out on the third day of the febrile reaction due to the rinderpest inoculation, as it was thought that three days of fever would be sufficient to cause a recrudescence of the Theileria infection, but this proved not to be the case. Blue bodies were only found in a small proportion of cases when high fever had existed for at least five or six days even though there was a very heavy invasion of the blood stream. Blue bodies were found to be present in gland smears for about two days only and to disappear when the temperature fell. The only lesion which can be considered characteristic is the presence of ulcers in the fourth stomach. These vary in size up to 1 cm. in diameter, they have thickened edges, and they vary in colour from red to white according to their age. They are almost invariably confined to the cardiac portion of the stomach.

As an explanation of the failure to detect blue bodies earlier the author suggests that calves are infected while young and that blue bodies may occur during the earliest attack and some of the first relapses. Subsequently such tolerance is established that blue bodies are not formed.

The severity of tick infestation is another factor in determining tolerance. In South Africa, where tick infestation is heavy, blue bodies appear in the glands before parasites make their appearance in the blood. In Northern Africa, where tick infestation is light, the reverse is the case.

VAN LIER (J.). **Over het voorkomen van** *Piroplasma canis* **in Ned. Indië.** [On the Occurrence of *P. canis* in the Dutch East Indies.] —*Nederl.-Indische Bladen v. Diergeneesk. en Dierenteelt.* Vol. 35. No. 1. pp. 46–54. [No date. ? 1923.]

In a previous paper (*Veeartsenijk. Bladen v. Ned.-Indië*, xxxii, Nos. 4 and 5, and xxxiii, No. 1) the author described a number of cases of acute jaundice in dogs in the East Indies. Although he was unable to find any spirochaetes in these animals, either by direct examination or by inoculation of guineapigs, he inferred—as a result of the clinical and post-mortem findings—that they were cases of canine Weil's disease. But WITKAMP (*Ned.-Ind. Bladen v. Diergeneesk en Dierenteelt*, xxxiv, Nos. 4 and 5) soon afterwards pointed out that the symptoms and pathological changes described bear a close resemblance to those of piroplasmosis, and suggested that *Piroplasma canis* might have been the real cause of the condition.

In the present paper the author carefully examines this criticism, and compares his own findings with those of WITKAMP and other writers on canine piroplasmosis. As a result he concludes: "The

symptoms and post-mortem findings in my dogs suffering from acute icterus, considered in conjunction with those described by WITKAMP and others in dogs suffering from canine piroplasmosis, together with the fact that in no single dog of mine, alive or dead, was *Piroplasma* found, do not convince me that my dogs with jaundice were cases of piroplasmosis." But the author regards the critique as well founded, and proposes to inquire further into the matter if an opportunity occurs. Incidentally he also notes that he has now seen 19 cases of acute icterus in dogs, and one in a cat : and that he has also observed, in the same animals, an acute disease with similar symptoms (incessant vomiting, great emaciation and anaemia, etc.) but unaccompanied by jaundice.*

HELM. **Beitrag zum Anaplasmen-Problem.** [Anaplasmosis.]—*Zeitsch. f. Infektionskrankh. parasit. Krankh. u. Hyg. d. Haust.* 1924. Feb. Vol. 25. No. 4. pp. 199–226. With 2 tables, 2 temperature charts, and 1 plate.

The material with which the author has worked was derived from animals imported into Germany from Texas.

Anaplasma-like bodies were found in the blood of a German ox which had been inoculated intravenously 19 days previously with 150 cc. of defibrinated blood from one of the Texas animals. Simultaneously, there was observed a lymphocytosis, but there were no clinical symptoms of infection. There were inoculated at the same time two white mice, two guineapigs and a sheep. No evidence of infection was obtained, and when the experiment was repeated it again failed to yield any positive result.

In an experiment with ticks (*Ixodes ricinus*), it was found that the larvae derived from females engorged on Texas animals were capable of transmitting the infection. The period elapsing between the placing of the larvae on the animal and the appearance of anaplasms in the blood was two months. The anaplasms increased in numbers until about 30 per cent. of the corpuscles were invaded. There was a simultaneous rise of temperature.

Culture experiments showed that multiplication of anaplasma could be obtained in a medium composed of defibrinated blood with the addition of dextrose in the proportion of 0·1 cc. of 50 per cent. dextrose solution to 6 cc. of defibrinated blood. The results of cultivation were variable. In some of the cultures the parasites retained their customary morphology, but in others forms were observed which have not been encountered in the blood of animals, crescent, bean and oval shapes being found. In the absence of sufficient controls the author was unable to furnish proof that these forms were actually related to anaplasma.

In one instance a subculture was obtained from the primary culture. The optimum temperature was found to be ordinary room temperature. At 32° C. the parasites disappeared rapidly. Negative results were always obtained with the blood of uninfected animals. The absence of suitable animals prevented attempts to transmit the disease by means of cultures from being carried out.

The author discusses the views that have been held with regard to the nature of anaplasma, and comes to the conclusion that the various bodies of a somewhat similar appearance which are sometimes found

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

in the corpuscles of healthy animals can be distinguished from true anaplasma either on account of their number, size, staining reactions, shape, position or by culture experiments from true anaplasms.

Whether anaplasms are actually parasites or a reaction product of some invisible cause remains to be shown.

NIESCHULZ (O.). **Bijdrage tot de Morphologie van het Geitencoccid** (*Eimeria arloingi*). [The Morphology of the Coccidium of the Goat.]—*Tijdschr. v. Diergeneesk.* 1924. Jan. 1. Vol. 51. No. 1. pp. 19–25. With 1 plate and 3 text figs.

The merozoites measure 8 to 14 μ in length, and from 1 to $1\frac{1}{2}$ μ in breadth. The nuclei of the merozoites prior to their separation from each other are ring-shaped, with small inner bodies. In the free merozoites the chromatin figure is in the form of a bi-concave cap, the inner bodies have a polar disposition. There is no distinct nuclear membrane.

In the macrogametes the chromatin of the nucleus varies in its form. In a ripe macrogamete the surface is covered with granules which do not stain with haematoxylin and probably represent a reserve food material.

Microgametocytes. In the stage when the nucleus is single these are mainly distinguishable from the macrogametes by the small size of the inner bodies, and by the looser texture of the chromatin. The microgametes are from 5 to 6 microns in length and possess two flagella measuring from 10 to 15 microns. These flagella come off from close behind the anterior end.

LAVIER (G.). **Sur la fonction du corps parabasal de Giardia.** [The Function of the Parabasal Body of Giardia.]—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Oct. Vol. 1. No. 4. pp. 342–343.

The author is unable to find any evidence that the parabasal body is in any way concerned with the production of glycogen as has been suggested by some investigators.

DESCHIENS (R.). **Action antiparasitaire des sels de bismuth " per os " et à doses massives dans les infestations à Giardia.** [The Antiparasitic Action of Bismuth Salts in Large Doses in Cases of Giardia Infestation.]—*Bull. Soc. Path. Exot.* 1923. Dec. 12. Vol. 16. No. 10. pp. 737–741.

The author has cured cases of Giardia infection in man (8 cases) and in experimentally infected cats with bismuth carbonate. In passing, the author notes that he found it impossible to infect with Giardia cats already infected with *Belascaris cati*, and he thinks that this may perhaps prove to be the explanation of the failure that has been experienced by some authors in their attempts to infect cats with the parasite. The main principles to be followed in the treatment are:- (1) The salts used must be pure and amorphous; (2) Large doses must be given. In man, 50 to 60 grammes should be given daily; (3) The treatment must be prolonged (in man)—one to two months.

In treating the human subject and with a view to preventing derangement of the stomach the bismuth carbonate should be taken on an empty stomach in the morning in water.

Parasites may disappear within 15 days, but it is usually necessary to prolong the treatment to 1 or 2 months. It is advisable to interrupt the treatment every ten days in order to "reactivate" the parasites by means of bile extract or calomel. The absorption of bismuth ceases during the reactivation and the young parasites are rendered more susceptible to it.

Since the bismuth salt is expensive and a treatment requires from 1·0 to 1·5 kilogrammes, its application is limited. Barium sulphate, kaolin and talc are not suitable substitutes.

A cure can only be claimed when systematic examinations of the faeces daily remain negative for 8 to 16 days. Details are given of the system of collecting the faeces daily from patients not in hospital.

BEN-HAREL (Shulamite). **Studies of Bird Malaria in Relation to the Mechanism of Relapse.**—*Amer. Jl. Hyg.* 1923. Nov. Vol. 3. No. 6. pp. 652–685. With 3 plates and 9 charts.

This paper is divided into three sections dealing with (1) The course of the infection; (2) The tissue changes associated with bird malaria; (3) Relapses occurring naturally and produced artificially. In connection with the course of the infection twenty-three infected birds were examined.

In four birds acute primary infections were found, in sixteen the disease showed an extended irregular course, and in the remaining three the disease ran a mild course of short duration.

In the spleen at the height of infection endothelial cells distended with pigment were seen, capillaries were found occluded by parasitized red corpuscles, mononuclear cells were increased in number, and young parasites were found both free and attached to mononuclear cells.

In the bone marrow in severe cases there is a reduction in the amount of fat, and a preponderance of mononuclear cells. There is dilatation of the capillaries and parasitized red cells and free trophozoites are found. Parasites were less numerous in situations other than the spleen and bone marrow.

Trophozoites, schizonts, and gametocytes were found.

Naturally occurring relapses were encountered in two birds. These occurred 101 days and 41 days after the parasites had last been seen in the blood. All the parasites were schizonts.

Relapse was produced artificially either by radiation with ultra-violet rays or by injection of adrenalin.

CANTLIE (N.). & MOUBARAK (El Sach Yusef). **Preliminary Observations on the Treatment of 1,314 Cases of Malaria by Intravenous Injection of Quinine.**—*Jl. Trop. Med. & Hyg.* 1924. Feb. 15. Vol. 27. No. 4. pp. 37–39.

The intravenous injections were made with a solution of bihydrochloride of quinine. The dose was 1 cc. containing 6 or 9 grains. The solution was injected slowly, so that about 45 seconds was occupied in the actual injection. The injection was repeated daily until the temperature fell. Two doses of quinine bisulphate, each of 10 grains, were also given daily by the mouth. Injections were stopped when the temperature fell and the oral administration was increased to 30 grains per day. After discharge from hospital 10 grains were given daily for a month.

The injection caused some acceleration of the pulse which lasted for about 3 minutes. In one or two cases there was vomiting and dizziness.

HENRY (T. A.) & BROWN (H. C.). **The Influence of the Medium on the Toxicity of Certain Alkaloids towards Protozoa.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. Mar. 15 & May 17. Vol. 17. Nos. 1 & 2. pp. 61–71.

The authors' conclusions are as follows :—

"The net results of this work, so far as therapeutical possibilities go, seem to be as follows :—

"1. The toxicity of quinine, emetine and conessine towards the protozoa used in the experiments [Glaucoma—a ciliate similar to Paramoecium] is considerably increased in an alkaline medium, and it is possible that if this condition can be realised *in vivo*, the action of these alkaloids in protozoal diseases may be made more certain and efficient . . . . .

"2. These results confirm SCHAEFFER'S observations that quinine dihydrochloride (acid) is less active than quinine monohydrochloride (neutral), and emphasise ACTON'S suggestion that for injection quinine base would probably be more efficient and possibly non-irritant, if a means can be devised for injecting it in solution in this form."

FRANCHINI (G.). **Sur des cultures très anciennes de flagellés.** [Old Cultures of Flagellates.]—*Bull. Soc. Path. Exot.* 1924. Jan. 9. Vol. 17. No. 1. pp. 32–35.

The author gives details of the re-examination of some of his old culture tubes. He has been able to detect encysted forms of the flagellates, and has been able to start fresh cultures from these.

CERNAIANU (C.). **Sur une epizootie de Spirochétose des poules. Action préventive et curative du neosalvarsan.** [An Outbreak of Avian Spirochaetosis. The Protective and Curative Properties of Neosalvarsan.]—*Archiva Veterinara.* 1923. Vol. 17. No. 4–5. pp. 80–84.

The author describes the symptoms typical of the disease, and indicates that spirochaetes were present in enormous numbers in the blood of diseased birds at the time of death.

A most careful search failed to reveal the presence of *Argas reflexus*, the usual transmitting tick, but *Dermanyssus avium* was found to be present in immense numbers in the fowl houses. Dermanyssus was found in small numbers only on the birds. *Menopon trigonocephalum* was also present, but not in very large numbers. An experiment in which an attempt was made to transmit the infection by means of Dermanyssus failed.

As atoxyl was not available neosalvarsan was used for treatment. A single intra-muscular injection of ·0375 g. per kilog. was found to be efficient for the cure of birds which had reached even the third or complete paralysis phase of the disease. Parasites had practically disappeared from the blood within three hours of the injection, and none could be found after five hours.

Thirty-one birds in various stages were treated, apparently with success in every case.

Eighteen birds which were showing no symptoms were treated as a precautionary measure. None of these became infected. Sulphur and lime-wash were used for the thorough disinfection of the fowl-houses.

RODHAIN (J.) **Sur la réceptivité des roussettes épaulières,** *Epomophorus Wahlbergi Haldemani* **Hallowell et** *Micropteropus pusillus* **Peters au** *Spirochaeta Duttoni* **Todd.** [The Susceptibility of the Flying Foxes to *Spirochaeta duttoni*.]—*Bull. Soc. Path. Exot.* 1923. Dec. 12. Vol. 16. No. 10. pp. 729–733.

VAN DEN BRANDEN and VAN HOEF have published accounts of their attempts to infect the common flying fox (*Eidelon helvum*) with *Sp. duttoni*. Success was not achieved.

Rodhain has carried out experiments with the species commonly found in the estuary of the Congo, and has succeeded in obtaining positive results.

Inoculations were carried out with a " mash " of ticks (*O. moubata*) from an area in which human spirillosis had been detected. Two flying foxes were used and in both cases the infection proved fatal. Death occurred on the 15th and 17th days.

The lesions were haemorrhages of the pleura and dura mater, anaemic infarcts of the spleen and kidneys. The spleen was enlarged. Smears of the organs showed the spirochaetes in immense numbers.

DISEASES DUE TO METAZOAN PARASITES.

GOSSET. **Présence de sangsues dans le larynx et le pharynx d'un cheval. Laryngotomie.** [The Presence of Leeches in the Larynx and Pharynx of a Horse.]—*Rec. Méd. Vet.* 1923. Dec. 30. Vol. 99. No. 24. pp. 480–481.

The horse, an entire arab, was brought under the observation of the author while in Syria because it had eaten nothing for two days, and because blood came from the nostrils. There was marked depression, the head was extended in line with the neck, and the throat was slightly swollen and painful. Pressure produced a weak cough. There was an abundant discharge of blood stained serum, containing clots of blood ranging in size up to that of one's thumb, from the nostrils. Blood-tinged saliva dribbled from the mouth. There was constant movement of the jaws. Deglutition was difficult. Respiration was slightly hampered. The following day, while the other symptoms remained unaltered, the difficulty of respiration was so pronounced that there appeared to be some risk of asphyxiation. It was decided to perform laryngotomy, with the double object of relieving the respiration and of permitting a detailed examination of the larynx and pharynx. Examination of the mouth revealed the presence of a single leech attached to the hinder part left lateral aspect of the tongue. Nothing could be detected in the nostrils.

The crico-thyroid ligament was divided and the interior of the larynx was found to be streaked with blood, among which were some small clots. A leech was found attached close to the glottis. Further examination revealed no more. A tracheotomy tube was inserted and the animal allowed to rise.

Three days later a fresh examination of the mouth led to the detection of four leeches attached to the base of the tongue at the sides. These were removed and the animal made an uninterrupted recovery.

RODHAIN (J.). **Larve de diptère parasite cuticole de l'Eléphant d'Afrique.** [Larval Diptera parasitic in the Skin of the African Elephant.]—*Bull. Soc. Path. Exot.* 1924. Jan. 9. Vol. 17. No. 1. pp. 86–92. With 1 text fig.

The parasite described in this paper was found in the skin of tame elephants at Api in the Belgian Congo. It is responsible for very very slight lesions only.

They occur on the croup, flanks, thighs and shoulders, and are observed during the dry season—September to February. Larva placed upon soft earth buried themselves, and the flies emerged after about 20 days. Unfortunately, they escaped and were therefore not examined.

The three larvae examined by Rodhain were at the third stage. They measured 7 to 10 mm. in length by 7 in breadth. For a detailed account of the morphological details of the parasite the original paper must be consulted.

GEDOELST (L.). **Les trois stades larvaires de** *Cobboldia loxodontis.* [The Three Larval Phases of *Cobboldia loxodontis.*]—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Oct. Vol. 1. No. 4. pp. 354–362. With 3 text figs.

The third phase larvae of *Cobboldia loxodontis* of the African elephant have been described by a number of authors, and the second phase larva was described by Gedoelst in 1916. The first stage has not previously been described.

The first phase larvae were found by BRUMPT in the stomach in 1902. These specimens have been sent to Gedoelst by LAROUSSE.

The author describes the first, second, and third phases in detail.

ALLEAUX (V.). **Ascaridiose des voies biliaires chez deux Porcelets.** [Ascarids in the Bile Ducts in Two Small Pigs.]—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Oct. Vol. 1. No. 4. pp. 352-353. With 1 fig.

The pigs were about six weeks old and showed evidence of abdominal pain. They were in good condition, but the fat and connective tissues were all greenish-yellow in colour. The bile duct was plugged with worms and worms were found in the smaller ducts in the substance of the organ. The intestines had been destroyed before the author saw them, but they were reported to have contained numbers of parasites.

LANE (Clayton). **Some Strongylata.**—*Parasitology.* 1923. Nov. Vol. 15. No. 4. pp. 348–364. With 80 text figs.

The author describes the following parasites: *Libyostrongylus* n. g., *Libyostrongylus hebrenicutus* n. sp. from the stomach and duodenum of a gorilla, *Agriostomum vryburgi* Railliet, 1902 (an amplified description from parasites obtained from *Bos indicus*), *Raillietostrongylus*

samoensis (Lane, 1922) from the small intestine of the domestic pig in Samoa, *Globocephalus connorfilii* Lane, 1922, small intestine of the domestic pig, Samoa, *Necator congolensis* Gedoelst, 1916 (an amplified description based upon the examination of specimens from the stomach, small intestine, ileo-caecal valve and colon of the gorilla. *Oesophagostomum radiatum* is recorded in the large intestine of the water buffalo, *Nippostrongylus muris* (Yokogawa, 1920). The examination of Trichostrongyloidea from the small in testine of the rat in Samoa permits of enlargement of the description of ***Heligmosomum muris.*** The symmetrical bursa and the bell-shaped ending of the female appear to require the allocation of this species to a genus other than Heligmosomum, for which the name Nippostrongylus is proposed, with *Nippostrongylus muris* as its type.

SMIT (H. J.) & NOTOSOEDIRO (R.). **Eenige Strongyliden onzer Huisdieren.** [Some Strongyles of our Domesticated Animals.]—*Nederl.-Indische Bladen v. Diergeneesk. en Dierenteelt.* Vol. 35. Nos. 2–3. pp. 191–198. With 4 figs. [No date.]

The worms described and figured in this paper are *Oesophagostomum dentatum, Oesophagostomum asperum, Oesophagostomum* (*Proteracrum*) *radiatum, Agriostomum vrijburgi.*

GOODEY (T.). *Necator americanus* **and the Domestic Pig.**—*Jl. Helminthology.* 1923. Sept. Vol. 1. No. 4. pp. 161–164.

The author has tried to infect two pigs both *via* the skin and by feeding with *Necator americanus,* but entirely without success.

TREFFERS (W.). **De leverbotziekte en hare bestrijding middels Distol.** [Distomatosis and its Treatment by Means of Distol.]—*Nederl.-Indische Bladen v. Diergeneesk. en Dierenteelt.* Vol. 35. No. 1. pp. 41–45. [No date.]

In central Java Treffers found 301 out of 1,874 bovines infected with Distoma (species not stated) within a period of 6 months. In 4 cases he tried the medicament " distol " in doses of 12–18 grams taken at once, or spread over 4 days. In 3 cases the ova disappeared from the faeces and there was a marked improvement in general health. The preparation should only be used in animals when the nutrition is impaired, the growth retarded, and faeces are fluid, and when ova are found. Here the application of the medicament is soon followed by improvement in condition, the faeces acquire a normal consistency, but the ova in some cases do not disappear till after 2–3 weeks. Treffers afterwards treated some more cases, which are not described in detail.*

ANDERSON (C.) & GOBERT (E.). **Note relative à la prophylaxie de la bilharziose en Tunisie.** [Prophylaxis against Bilharzia in Tunis.]—*Bull. Soc. Path. Exot.* 1924. Jan. 9. Vol. 17. No. 1. pp. 35–37.

BITTNER (H.) *Schistogonimus rarus* **(Braun), ein seltener Trematode in der Bursa Fabricii einer an Tetrameres-Invasion gestorbenen Hausente.** [*Schistogonimus rarus* an Uncommon Trematode of the Duck.]—*Arch. f. Wissen. u. Prakt. Tierheilk.* 1923. Vol. 50. No. 3. pp. 253–261. With 1 text fig.

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* Summarized by Dr. N. H. Swellengrebel.

CAMERON (T. W. M.). **On the Morphology of** *Ollulanus tricuspis* **Leuckart, 1865, a Nematode Parasite of the Cat.**—*Jl. Helminthology.* 1923. Sept. Vol. 1. No. 4. pp. 157–160. With 6 figs.

CAWSTON (F. G.). **Bifid-Tailed Cercariae in Burnupia.**—*Jl. Trop. Med. & Hyg.* 1923. Dec. 15. Vol. 26. No. 24. pp. 363–364.

CHALON (G.). **Présence d'** *Ornithodoros savignyi* **(Audouin) à Ouargla (Sahara algérien).** [The Presence of *Ornithodorus savignyi* (Auduoin) at Ouargla in the Algerian Sahara.]—*Bull. Soc. Path. Exot.* 1923. Dec. 12. Vol. 16. No. 10. pp. 741–742.

CHANDLER (A. C.). **Observations on the Life Cycle of** *Davainea proglottina* **in the United States.**—*Trans. Amer. Micros. Soc.* 1923. July. Vol. 42. No. 3. pp. 144–147. With 2 text figs.

CONREUS (A. Charles). **Cachexia ossea dos equidos. Cylicostomose, Cachexia verminosa dos equideos.** [Osseous Cachexia of Equines. Cylicostomiasis.]—1° *Cong. Nac. Med. Vet. Brasil.* 1922. Sept. Rio de Janeiro. pp. 75–119.

SCHUURMANS STEKHOVEN (J. H.). **De Bloedzuigende Arthropoda van Nederlandsch-Oost-Indië.** [The Blood-sucking Arthropods of the Dutch East Indies.]—*Nederl. Indische Bladen v. Diergeneesk. en Dierenteelt.* [no date.] Vol. 35. Nos. 2–3. pp. 103–144. With 4 text figs.

SCHUURMANS STEKHOVEN (J. H.). **De Bloedzuigende Arthropoda van Nederlandsch-Oost-Indië. VI. De teeken van de Kleine Soenda-eilanden.** [The Bloodsucking Arthropods of the Dutch East Indies. VI. The Ticks of the Small Islands of the Sound.]—*Nederl. Indische Bladen v. Diergeneesk. en Dierenteelt.* [no date.] Vol. 35. Nos. 2–3. pp. 145–148.

SMIT (H. J.). **Nog eenige Strongyliden van het Paard op Java. IV.** [The Strongyles of the Horse in Java.]—*Nederl. Indische Bladen v. Diergeneesk. en Dierenteelt.* [no date.] Vol. 35. No. 1. pp. 29–36. With 5 figs.

SMIT (H. J.). *Paramphistomum explanatum.*—*Nederl. Indische Bladen v. Diergeneesk. en Dierenteelt.* [no date.] Vol. 35. Nos. 2–3. pp. 185–190. With 2 figs.

BACTERIAL DISEASES.

PFENNINGER (W.). **Zur Diagnose der Bazillenausscheider in der Milch beim durch Bac. Bang verursachten infektiösen Verwerfen des Rindes.** [The Detection of Abortion Bacilli in the Milk of Animals affected with Contagious Abortion.].—*Schweiz. Arch. f. Tierheilk.* 1923. Dec. Vol. 55. No. 12. pp. 600–609.

The author describes the results obtained with milk from 26 cows. Guineapigs were inoculated with sediment from 50 cc. of milk obtained by centrifuging for 10 minutes at 2,000.

The serum of the guineapigs was tested by agglutination for the first time four weeks after inoculation, and for the second time two to four weeks later.

Eight positive results were obtained out of the 26 samples tested, but the author states that three samples were obtained from recently purchased animals which had come from uninfected herds, so that in reality the figures read as eight positive results out of 23, or 34·8 per cent.

Five of the cows had aborted and three had not.

In two cases the guineapigs inoculated were pregnant, and the bacillus was detected microscopically and by culture in material from the stomachs of the foetuses.

HOLMAN (W. L.) & FERNISH (C. A.). **Studies on *Bacillus anthracis* from the Faeces of Guinea-pigs fed with Anthrax Material.**—*Amer. Jl. Hyg.* 1923. Nov. Vol. 3. No. 6. pp. 640–648.

The object of the authors in carrying out these experiments was to elucidate the problem as to the occurrence or otherwise of anthrax contracted by way of the alimentary canal. The possibility of anthrax being contracted by this path has been denied by BESREDKA. Guinea-pigs were used in the experiments, and to avoid accidental infections by other paths sporulating culture material was placed in gelatin capsules and these were placed well back in the animals' throats.

In all, twenty-one guineapigs were used, and a systematic study of the faeces was carried out in nineteen of these. Only one animal died of anthrax, the remaining eighteen survived. The faeces were examined by plating, and colonies obtained were subsequently identified by inoculation into other guineapigs. In the course of the experiments a sporulating aerobe was detected in the faeces which formed colonies remarkably like those of anthrax.

In the course of the experiment observations were made regarding the possibility of non-sporulating anthrax bacilli forming spores in the alimentary tract. Blood from an animal just dead and spleen pulp from a similar source were fed to guineapigs in capsules. The absence of spores in the material was established by the fact that cultures could not be obtained from the blood when it had been heated to 70–80° C. for 20 minutes. Spores were found in the faeces of the guineapig fed with spleen pulp. The authors have shown that if laboratory animals are inoculated at a place where there is a small amount of connective tissue such as the ear there is no visible local reaction in the form of an oedema.

BROCQ-ROUSSEU & URBAIN. **Cuti-vaccination et cuti-immunité anti-charbonneuse chez le cheval.** [Cuti-Vaccination and Cuti-Immunity against Anthrax in the Horse.]—*Rec. Méd. Vét.* 1923. Dec. 30. Vol. 99. No. 24. pp. 482–487.

In this short paper the authors' reproduce the two experiments previously recorded [see this *Bulletin*, 1924, Feb., Vol. 12, no. 1, pp. 27 & 28] and add a third one.

The object of this experiment was the reduction of the interval between the doses of vaccine. The horse was first given 2 cc. of first vaccine. This was injected into the skin of the right side of the neck at 20 different places. Slight oedema appeared at each seat of inoculation and persisted for two days. On the third day after the first inoculation 0·25 cc. of second vaccine was given intradermally and in two injections. A transitory oedema again appeared. Thirteen days after the dose of second vaccine 1 cc. of a very virulent culture of the bacillus was injected intradermally. The result was the development of an oedematous swelling measuring 25 by 20 centimetres with some swollen lymphatics round it. The swelling had quite disappeared by the fifth day. The temperature remained normal throughout. No antibodies could be detected in the animal's serum.

The experiment indicates that a skin immunity was obtained by skin vaccination.

ZELLER (H.). **Ueber den gegenwärtigen Stand der Schutzimpfung gegen Rauschbrand mit keimfreien Filtraten.** [The Present Position regarding the Use of Germ-free Filtrates for Black-Quarter Vaccination.]—*Berlin. Tierärzt. Wochenschr.* 1924. Jan. 31. Vol. 40. No. 5. pp. 49–51.

The author summarizes briefly the results which have been obtained with filtered cultures and the "natural aggressin," that is, filtered peritoneal fluid obtained from experimentally infected animals.

GRÄUB (E.). **Weitere Mitteilungen über die Schutzimpfungen gegen den Rauschbrand mit dem keimfreien Filtrat Gräub-Zschokke.** [Further Results obtained by Vaccinating against Black-Quarter with a Germ-Free Vaccine.]—*Schweiz. Arch. f. Tierheilk.* 1924. Jan. 31. Vol. 66. No. 2. pp. 33–35.

The author gives the figures for the inoculations carried out in Switzerland in 1922 and 1923. The total number of animals vaccinated was approximately 70,000 and 90,000 in the two years. No cases of black-quarter followed the vaccinations but the immunity was broken down in 71 cases in 1922 and in 87 in 1923, *i.e.*, about 1 per 1,000 in each year.

The distribution of the cases of black-quarter appears to have been irregular and not in proportion to the number vaccinated. It is further noted that approximately 60 per cent. of the cases occurred in Bern in both years.

An increase of the dose of filtrate used from 2 cc. up to 3–5 cc. did not affect the number of cases developing subsequently. It appears to be probably that some of the deaths were not due to infection with the bacillus of black-quarter, but to infection with the vibrion septique (in 32 per cent. of cases).

TRUCHE (C.). **De la typhose aviaire.** [Fowl Typhoid.]—*Ann. Inst. Pasteur.* 1923. May. Vol. 37. No. 5. pp. 478–497.

The author states that at the present time three diseases are causing serious losses among poultry in France. These are fowl cholera, fowl typhoid, and fowl diphtheria. These diseases have special geographical distributions. Fowl cholera occurs in the north and eastern areas and is believed to have been imported from Germany, fowl diphtheria in an area having a radius of 100 kilometres round Paris, and fowl typhoid, which is described as a new disease, in the region between the Loire and the Pyrenees. This is not to say that the diseases do not occur outside their various areas, but that the areas indicated are those generally involved.

Fowl typhoid is said to have been practically unknown in France prior to the war, although it was widespread in Europe, apart from France, and in the United States.

There are two distinct diseases classed as fowl typhoid ; they are caused by closely allied organisms, but are clinically distinguishable. These are white scour, caused by *Bact. pullorum*, and true typhoid, caused by the *Bact. sanguinarium* or *Bact. gallinarum alcalifaciens*. White scour occurs in birds ranging in age up to two months. The faeces are very fluid and are passed frequently. Their colour changes

from yellow to greenish and finally to white. There is general evidence of depression and progressive weakness. The course of the disease varies somewhat, but as a rule it terminates fatally in two or three days. Lesions are as a rule inconspicuous, save that there is almost invariably marked enlargement of the liver. This organ may weigh five or six times the normal weight. The other lesions are intestinal congestion with haemorrhagic plaques, slight enlargement of the spleen, and the typical intestinal contents.

The disease is transmitted to the eggs, and fowls which recover harbour the organism in the ovary and oviduct. Although the disease is mainly seen in young birds, adults do not escape entirely.

The true typhoid infection occurs in adult birds. Those affected lose their appetite, and have a dull and sleepy appearance. Diarrhoea is observed in some cases, but it is not an invariable symptom. The temperature is raised, the features ruffled, the wings drooping, and the gait uncertain. The disease usually runs its course in about a week or ten days, but it may last for three weeks. The mortality is variable. Some authors describe a marked leucocytosis accompanied by a reduction in the number of red corpuscles. The lesions are not conspicuous. When the disease runs a rapid course there is only a slight degree of wasting. The liver is a little enlarged, soft and friable, and of a pale yellow colour. There is sometimes enlargement of the spleen, but it is never haemorrhagic. There may be some congestion in the portal area. Only adult birds are attacked, and infection takes place by ingestion. It is not always possible to set up the disease by the ingestion of cultures. The organism may be very scantily present in the blood, and subcutaneous inoculation with this may fail to cause infection.. Cultures vary in toxicity. They may cause the death of mice within 36 hours, but in some cases the inoculation does not cause death.

Inoculation with spleen pulp is almost invariably fatal, but the period of incubation is usually rather long, and may be as much as five days.

Special attention is drawn to the occurrence of the organism in the central nervous system and bone marrow, from which it may be obtained in a state of purity several days after death. The disease is most commonly seen in the fowl, but may occur in the duck, goose, turkey, and pigeon. In the last of these it is agreed by a number of investigators that it is difficult to produce infection. Rabbits and mice are susceptible to varying degrees, but guineapigs are resistant to subcutaneous inoculation. A fatal result is obtained with certainty when large doses are injected intraperitoneally.

The disease occurs at all seasons, but appears to be particularly severe during the summer.

Poultry shows are credited with causing the dissemination of the disease. Both the *Bac. pullorum* and *B. gallinarum* grow rapidly in broth. They produce turbidity and a deposit. There is never a complete surface growth, but there may be a ring of growth round the margin of the surface of the broth. The cultures produce an odour resembling that of Bacillus para. B. There is no production of indol in peptone waters.

On agar, opaque white hemispherical colonies measuring 2–3 mm. develop. After several days the colonies become brown in the centre.

B. gallinarum is a short rod-shaped organism measuring 1 to 2·5 μ in length by 0·3 to 0·5 μ in thickness. The ends are slightly rounded.

In Martin's broth it is often shuttle-shaped. On agar there is no formation of chains. It is non-motile and gram negative. In cultures in liquid media the organisms stain in a bipolar manner. It is both aerobic and anaerobic. It is readily killed at 55° C. (20 minutes).

Morphologically and culturally *B. gallinarum* and *B. pullorum* are identical, but while mannite, arabinose, laevulose, and glucose are fermented by both, there is an evolution of gas in the case of *B. pullorum*. This is the most important differential feature.

B. pullorum, *B. sanguinarium*, Eberth's bacillus and paratyphoid A are reciprocally agglutinated with the corresponding sera.

The filtered cultures of both organisms are toxic, but the toxicity varies in different strains. The fatal dose for a rabbit by intravenous injection ranges from 1 to 3·5 cc.

The question of transmissibility to man has not yet been solved, but in certain instances intoxications of alimentary origin have been thought to have been due to the ingestion of raw eggs infected with *B. pullorum*.

No medicinal treatment of any real value has been discovered, and various vaccines and sera have been tried with varying success. A point which militates against the use of vaccines is the apparent necessity that the vaccine should be autogenous.

BRIDRÉ (J.) & DONATIEN (A.). **Le microbe de l'agalaxie contagieuse et sa culture in vitro.** [The Organism of Contagious Agalaxia and its Cultivation in Vitro.]—*Rec. Méd. Vét.* 1923. Nov. 30. Vol. 99. No. 22. pp. 441–444.

The authors claim to have been able to cultivate the causal organism of contagious agalaxia of the sheep. A number of earlier investigators have been unable to produce the disease with bacteria cultivated from diseased animals.

The seed material was derived from the liquid from a joint showing specific lesions. This was diluted to about 3 per cent. in citrated salt solution. The medium used was mutton broth 2 to 4 parts, and horse serum 1 part. Cultures were incubated at 37° C., and after 8 days evidence of growth was obtained. Microscopic examination failed to reveal any recognisable bacteria, but subcultures were carried on in series and growth was found to be more rapid as the series progressed. After 20 generations growth was visible in 36 hours.

The organism grows either under aerobic or anaerobic conditions. If only a drop or two of seed material is used and the broth is not disturbed growth takes place as a faint ring-shaped cloud at the place where the seed material has been introduced. This increases in size, but there is no tendency to sedimentation. In tubes in which the broth is covered with paraffin the cloud forms immediately below the layer of oil and gradually extends until the whole of the medium is turbid. Veal or beef may be used to replace mutton in preparing the broth without affecting the results. Positive cultures have been obtained with a drop or two of virulent milk diluted to 1 in 200.

Surface cultures may be obtained on solid serum or serum agar. The colonies are small, irregular in outline, and are surrounded by an iridescent rim.

The proof of the causal connection of the organism with the disease rests upon (1) The production of specific arthritis in a sheep with 0·5 cc. of a seventh subculture, it being argued that it cannot be

persistence of original material since a dilution of original virus to a corresponding extent (calculated 3×10^{14}) is incapable of producing the disease; (2) A goat inoculated with a culture of the seventh generation developed mammitis on the eighth day, and milk from this animal injected into a joint of a sheep produced arthritis, and, after a few days, keratitis; (3) The virus has been maintained by passages in vivo and in vitro, and the twentieth generation caused specific arthritis and keratitis in a sheep.

It is noted that all the cultures used for inoculations were made under paraffin.

A preparation from the tenth generation was stained by the slow Giemsa method after May-Grünwald fixation, and in this the organism was found to be present in various forms ranging from a slender bacillus 2 to 5 μ in length, more or less curved and resembling vibrios, to long spirochaete-like forms.

This appearance has been preserved in successive cultures. As cultures become old, deeply-stained granules appear at one end of the organism. With the ultra-microscope some individuals appear as a chain of cocci. With the same instrument it can be seen that the organism is motile, and it is said that the type of motility resembles that of the mosquito larva in water.

The authors draw attention to the resemblance in both cultural character and morphology between this organism and that of contagious peripneumonia—the first filterable virus to be cultivated.

DISEASES DUE TO FILTERABLE VIRUSES.

RABAGLIATI (D. S.). **Experiments on the Immunity conferred on Calves by Inoculation against Cattle Plague.**—*Jl. Comp. Path. & Therap.* 1924. Mar. Vol. 37. No. 1. pp. 1–18. With 3 charts.

The author publishes in this paper certain results which it was intended should be published by a committee at whose instigation the experiments were carried out, but which was dissolved before that could be done.

The object of the experiments was to obtain information regarding the immunity possessed by calves born of animals immunized by the simultaneous method during pregnancy. Certain other points also came up for consideration in connexion with immunity of calves. In the first set of experiments it was found that calves born of cows doubly inoculated during pregnancy may behave in one of three ways when tested by inoculation with virulent blood. Some of the calves were tested one month after birth and while still sucking, and some were also tested at five months, that is to say, one month after weaning. They may react to an inoculation with virulent blood both before and after weaning. More frequently they do not react to inoculation while sucking, but may react after weaning. They may fail to react to both test inoculations. The calves which received virulent blood after weaning, whether they reacted or not, were proved to be immune up to 1 year and 10 months. It is noted that the experiment shows

that the double inoculation failed to cause any disturbance of health in the pregnant cows, although some of these were in an advanced stage of pregnancy.

Circumstances prevented the carrying out of any tests on calves born of animals which were subjected to double inoculation, but which failed to show any evidence of reaction when the inoculation was carried out. The results obtained with calves the progeny of animals immunized before service were generally similar to those obtained with calves the progeny of animals immunized during pregnancy.

In this set of experiments it was established that calves of cows which were doubly inoculated prior to service may or may not react to a double inoculation at ages of 6 months or more, irrespective of whether the dams showed any reaction to the immunization or not. Experiments were carried out with a view to determining at what age calves can be immunized by double inoculation so as to yield a lasting immunity, and the results indicated that calves of 1 year can be treated in the same manner as adult cattle.

The experiments supply confirmation of the fact that a reaction to the double inoculation is not essential for the production of immunity. The conclusion is drawn from the experiments that though the double inoculation of calves may not establish a lasting immunity, it is preferable that such inoculations should be carried out.

DE SOUZA (Moacyr Alves). **Algumas experiencias com a peste bovina em S. Paulo em 1921.** [Some Experiments in connection with Rinderpest in S. Paulo in 1921.]—1° *Cong. Nac. Med. Vet. Brasil.* 1922. Sept. Rio de Janeiro. pp. 72–74.

The period of incubation was 2 to 4 days, and the duration 5 to 7.

A specimen of *Margaropus bovis* which had engorged itself upon an animal infected with rinderpest maintained the virus at full virulence for 7 days. Emulsions of infected ticks which were kept at room temperature and protected from light failed to transmit the disease after 16 days.

The eggs derived from infected ticks were found to be avirulent.

BARROS (Paulo de Moraes). **A peste bovina. Notas, com referencia particularmente ás observações nas Ilhas Philippinas.** [Rinderpest.]—1° *Cong. Nac. Med. Vet. Brasil.* 1922. Sept. Rio de Janeiro. pp. 56–63. With 1 map.

This paper contains an account of an outbreak in Sao Paulo.

FROSCH (P.). **Zur Morphologie des Lungenseucheerregers. II. Mitteilung.** [The Morphology of the Causal Organism of Pleuro-Pneumonia.]—*Arch. f. Wissensch. u. Prakt. Tierheilk.* 1923. May 10. Vol. 49. No. 6. pp. 273–282. With 11 figures.

In this paper the author describes the appearances presented by the organism in a number of different culture media and gives photographs of these. In all cases the microphotographs were taken without any fixing or staining of the specimens.

DAHMEN (H.). **Beitrag zum Studium der Lungenseuche des Rindviehs. II. Mitteilung.** [Contribution to the Study of Pleuropneumonia of Cattle.]—*Arch. f. Wissensch. u. Prakt. Tierheilk.* 1923. May 10. Vol. 49. No. 6. pp. 283–288.

The author describes an improved method of preparation of cultures for antigenic purposes. With a view to getting a layer of agar throughout the length of his tubes he heats the glass, and by pressure produces a ridge across the tube projecting into the lumen. This acts as a barrier when the tubes with the agar in them are laid flat on the table, and enables him to get a layer of agar of constant thickness. The surface of the agar after setting is covered with sterile serum. Water of condensation is avoided by incubating the tubes for a couple of days after they have been prepared.

Colonies appear in 3 to 5 days after the tubes are inoculated. With tubes prepared in this way the author has succeeded in obtaining primary cultures from diseased lungs with ease, colonies becoming visible within 3 to 4 days.

In obtaining primary cultures Dahmen advises that the original material should be enriched by incubation for two or three days before it is used for the inoculation of the agar tubes. In investigating the cultural characters the author has found that the organism produces acid but no gas in media containing sugar.

Evidence was obtained that the growth tends to sink to the bottom of liquid media, and further, that the organism is non-motile.

In observation with fermentation tubes which have not been inoculated, Dahmen has obtained evidence that serum added to broth "absorbs acid." Cultural experiments with fermentation tubes have shown that the organism is an obligatory aerobe. Acidity is necessary for the growth of the organism.

For agglutination tests the author uses a mixture in equal parts of a serum-grape-sugar-broth culture and salt solution. The degree of turbidity of this mixture is sufficient to make it possible to obtain recognisable clearing with positive sera. The tubes were incubated for 3 hours and were then centrifuged for 10 minutes. The deposit is then examined. When the tubes were agitated flocculi were detected in those containing positive and negative sera, but they were distinctly larger in the case of the tubes containing positive sera. The author thinks that the reaction obtained with liquid cultures in agglutination experiments is in reality in the nature of a precipitin reaction.

GIESE (C.) & WEDEMANN (W.). **Zur Feststellung der Lungenseuche beim lebenden Rinde.** [The Detection of Pleuropneumonia in the Living Ox.]—*Zeitsch. f. Infektionskr. parasit. Krankh. u. Hyg. d. Haust.* 1924. Feb. Vol. 25. No. 4. pp. 176–189.

For preparing antigen for use in the complement fixation test the authors use the following medium. Beef broth is prepared (apparently without peptone or salt) and its reaction is corrected to pH8 (Michaelis). It is then heated to 100° and filtered through paper. When it has cooled down to about 40°, 8 per cent. horse serum and 0·5 per cent. glucose are added. The broth is then filtered through a Berkefeld filter. It is placed in Erlenmeyer flasks. These are inoculated with seed material and incubated for at least 6 to 8 weeks. The

resulting material is the antigen and it may be kept by sealing up suitable quantities (5 cc.) in small tubes.

The authors have carried out tests with materials from some hundreds of herds in which the presence of the disease was suspected, and from an almost equal number of herds in which there was no such suspicion. Details are given of ten of these. The results of the tests are given and are compared with the results of post-mortem examinations. These indicated that the method is practicable for the detection of the disease.

IMAMURA (Arao). **Über die Kultur des Lyssavirus in Vitro.** [The Artificial Cultivation of the Virus of Rabies.]—*Mitt. a.d. Med. Fak. d. Kaiserl. Univ. Tokyo.* 1922. Sept. 25. Vol. 29. No. 2. pp. 347–375.

The author has used pieces of fresh sterile central-nervous tissue in either horse serum or citrated rabbit plasma for the purpose of cultivating the virus of rabies. His seed material has in the present experiments been of the " fixed virus " type, but he indicates the necessity of experimenting with the virus of street rabies. Fragments of nervous tissue containing fixed virus, emulsions and filtrates have all been used for seed material, but success has been achieved with fragments only.. Although the author was able to show that the virus was present in the fresh pieces of nerve tissue in the culture tubes he did not at any time discover the virus by microscopic examination. The virus was proved to be present in the nerve tissue after 4 to 8 days incubation at 37° C. It was found that ·0001 g. of this was sufficient to infect a rabbit by subdural inoculation. The cultivation was carried on for four generations successfully, but owing to unavoidable circumstances the experiments had to be brought to a close without being carried further.

IMAMURA (Arao) & SATOH (Shinchoku). **Über die Virulenz des Virus fixe der Lyssa für das Kaninchen und die Veränderung desselben durch verschiedene Einflüsse.** [The Virulence of the Fixed Virus of Rabies for the Rabbit, and its Alteration by Various Means.]—*Mitt. a.d. Med. Fakult. d. Kaiserl. Univ. Tokyo.* 1922. Sept. 25. Vol. 29. No. 2. pp. 307–319.

The authors' experiments led them to conclude that the average fatal dose of brain substance was ·002 mg., and that undried spinal cord was fatal in the same dose.

When the glycerin used for preserving brains had ·5 per cent. of carbolic acid added to it the virulence was well preserved.

An emulsion rapidly lost virulence at room temperature during the summer, or when it was kept in an incubator at 29° C. Dried cords similarly lost virulence when kept at similar temperatures.

AYNAUD (M.) **La Stomatite pustuleuse contagieuse des ovins (Chancre du Mouton).** [Contagious Pustular Stomatitis of the Sheep. (Chancre of the Sheep).]—*Ann. Inst. Pasteur.* 1923. May. Vol. 37. No. 5. pp. 498–527. With 2 figs. & 1 plate.

The disease occurs as an epidemic and its spread through a flock is extremely rapid. Young animals, especially those that are being

fattened for the butcher, are the most frequently affected. The disease has a very wide distribution, and it occurs more frequently in France since the war than formerly.

Sometimes the lesions remain confined to the lips, where dark coloured crusts are formed. Sometimes there is oedema of the lips. The first phase of the lesions is represented by erosions of variable size, which are easily caused to bleed. Neither a vesicular nor pustular stage is observed. The crusts result from the abundant serous exudate from the eroded surfaces. Sometimes they develop on the eyelids, and they may in fact be observed on any part that is devoid of wool as a result of direct inoculation. On a single animal lesions in various stages of development may be seen. When the lesions remain confined to the lips the affected animals are not inconvenienced, and continue to feed, but when the interior of the mouth is invaded the disease has serious consequences. Salivation is pronounced and the affected animals are unable to feed. The disease runs its course in about 12 days. At the post-mortem examination the author has always found a secondary pneumonia due to a pasteurella. He has never found the specific lesions in the respiratory tract. Death is, in fact, due to the secondary invaders, and the mortality depends to some extent upon their virulence. The mortality may be up to 20 per cent. or even higher. The disease is easily reproduced by inoculation, and the best site is on the inner aspect of the thigh, where light scarifications may be made. Evidence of infection is first seen on the third day when the scarifications are reddened. By the sixth day vesicles form along the scarifications. These contain a clear watery liquid. Subsequently, the exudate increases in amount and becomes purulent. The covering of the pustule then becomes detached and the typical crusts form. Though the neighbouring glands may become enlarged, there is no systematic disturbance. The crusts become detached about the twentieth day, exposing cicatrized epidermis. Inoculation on the mucous membrane of the mouth by scarification usually fails because the virus is washed away by the saliva, but if the virus is introduced into the epithelium by puncture with needles success is sometimes achieved. Crusts do not form on lesions of the mucous membrane for obvious reasons.

Histological examination shows that the lesions begin in the thickness of the epithelial layer.

The disease is not transmissible experimentally save by endermic inoculation, and animals of all ages can be infected by experiment. Goats are as susceptible as sheep, and passage through the goat does not prevent the virus from being retransferred to the sheep. The author has succeeded in infecting calves either with lymph direct from a sheep or after passage through a goat.

Rabbits, guineapigs, rats, mice, pigs, donkeys, foals, and birds all appear to be immune.

The crust and lymph are both virulent and it has been found possible to produce infection with dilutions of 1 in 10,000, or even 1 in 100,000. The bulk of the virus is closely associated with the cellular elements. It retains its virulence for a month and perhaps longer in glycerin, but the maximum has not been ascertained, since it is more convenient to keep it in the dry state. Dry crusts maintain their virulence for a year.

Positive results have been obtained with fresh lymph after filtration through earthenware filters. Centrifugation does not appear to

cause the virus to become sedimented. It is difficult to explain this, but it simplifies the preparation of a vaccine free from contaminations. The virus is killed in 30 minutes by a temperature of 56° C. Dry virus is rather more resistant than lymph. Immunity is acquired about three weeks after infection. It has been found that immunity can be conferred by intravenous inoculation, but not by ingestion. The author has not been able to detect any antibodies in the serum. The question is raised as to whether chancre of the sheep and vaccinia are in reality identical. The author, mainly upon the grounds of animal experimentation, comes to the conclusion that they are separate entities. The experiments included cross immunity tests.

For protective inoculation the author has used dried scabs from experimentally infected animals. Powdered scabs are mixed with 50 per cent. glycerin in the proportion of 1 part to 100.

Vaccination is practised on the inner aspect of the thigh, the only instruments necessary are a Chambon lancet and swabs on stiff wire handles. Fifty cubic centimetres of vaccine is sufficient for 200 animals.

It is admitted that it is possible for a vaccinated animal to infect a healthy one and set up the disease, but in practice this risk is found to be negligible. Vaccination does not prevent the evolution of the disease in animals already actually infected. Vaccination is advised even in infected flocks with a view to shortening the duration of the disease in the herd.

MISCELLANEOUS.

Moussu (R.) & Marchand (L.). **L'encéphalite enzootique du cheval.** [Enzootic Encephalitis in the Horse.]—*Rec. Méd. Vét.* 1924. Jan. 15. Vol. 100. No. 1. pp. 1–44.

Enzootic encephalitis, or Borna disease, does not appear to have been known in France prior to the war, but it would appear that it is not a rarity now and that in all probability it was introduced through the medium of American horses. A number of European investigators have isolated organisms, usually diplococci or streptococci, from the central nervous system of infected horses, but in no case have these organisms been found capable of setting up the disease by inoculation.

Kraus, Kantor and Quiroga, working in the Argentine, have, however, isolated an organism which they have found capable of setting up a bacteriaemia in horses, rabbits, guineapigs, sheep, goats and calves, and has proved fatal in 24 hours. But it is to be noted that while in horses inoculated intracranially the organism can be isolated from the brain and from the blood, in animals inoculated intravenously it can be recovered from the blood and not from the nervous system. It is further noted that the lesions produced experimentally in the nervous system differ markedly from those occurring in a natural case. Kraus, Kantor and Quiroga have been able to produce similar results with organisms other than the diplococcus which they incriminate as the cause of Borna disease. It therefore seems clear that the etiology of the disease has not been cleared up. Our accurate knowledge of the histology of the lesions of

Borna disease is due to the work of JOEST and DEGEN. These authors have shown that the disease is an acute encephalitis characterized by perivascular infiltrations in the brain and spinal cord, with cellular inclusions in the hippocampus and olfactory bulb.

The outbreak of the disease, which formed the starting point of the authors' observations occurred in a thoroughbred stud comprising some 80 animals. Fifteen cases occurred within 2 months, and of these six proved fatal.

The disease manifested itself in three forms : (1) As an encephalitis ; (2) As a myelitis ; and (3) As a combination of these.

Encephalitic form.—The authors have not observed the gastro-intestinal disturbances nor the catarrh of the respiratory passages described by other investigators. The disease has been sudden in its onset and characterized by dullness and depression. Within a few hours a condition of intense excitement has supervened. The periods of excitement last only for a few minutes at first and are followed by periods of depression. The attacks, however, become more prolonged and more frequent until the animal falls to the ground struggling. The authors' attention has been specially attracted by tonic spasms of the flexors of the head and neck during the attacks. There is no loss of sensation, but it is dulled. There is no motor paralysis, but in some cases there is difficulty in swallowing. While there is no alteration in the respiratory rhythm, the respiratory movements are almost invariably irregular.

The authors have encountered cases which they describe as being of the myelitic type, that is to say, without there being any symptoms of distinctly cephalic origin. One of these was in a mare which, if observed at rest in the stable, had every appearance of health, but which, when walked or trotted, showed marked evidence of motor paralysis involving principally the hind limbs. Respirations were slow and deep. There was incontinence of urine, and if the mare were turned round the urine was ejected in a jet. The urine was mucilaginous in consistence and on standing threw down a clot. On testing, it was found to contain 3 grammes of albumen per litre. The condition remained stationary for about 4 days, then the locomotor paralysis began to diminish and had disappeared by the 8th day, but there was no improvement with regard to the urinary system for a fortnight.

The authors consider that the symptoms presented indicate involvement of the lumbar cord, but in the absence of histological evidence they are unable to state that there were no lesions in the brain.

The majority of the cases observed (9 out of 15) were of the mixed type, and presented some of the symptoms described under the other two headings.

One of the most striking features of the cases when examined post-mortem was the extreme rapidity with which putrefaction occurred. The lesions are those of an acute septicaemia. The blood is black and uncoagulated, the vessels are engorged. There is pronounced congestion of the intestine. The liver is soft, the spleen enlarged and more or less diffluent. The kidneys are soft and moist. The lungs are congested and in some cases there is a blood tinged exudate. The mucous membrane of the respiratory tract has an appearance which suggests that it is covered with a layer of tar. The muscles are infiltrated and have a cooked appearance. The cerebro-spinal fluid is normal in appearance and quantity.

It is stated that the majority of post-mortem examinations have been carried out 24 hours after death, and that the authors consider that the lesions they described as being those of a septicaemia are in reality in the nature of secondary changes and not those of the disease itself. But they state that they draw attention to them because of their constant occurrence.

Histological examinations.—Lesions of the meninges are of rare occurrence and inconspicuous in character. The nerve cells of the cortex of the brain are surrounded by rounded embryonic cells. No cell-inclusions nor bacteria have been found in sections of the brain. The capillaries show in some places a perivascular infiltration with rounded cells, but it is exceptional to find more than a single layer of cells surrounding a capillary. The small veins are pronouncedly congested, and at places extravasated corpuscles may be found.

The fact that the authors had a mortality of 6 only out of 15 cases they attribute to the treatment adopted, and they point out that 4 of the 6 animals which died had no treatment.

All the cases, five in number, which showed evidence of involvement of the brain, died, and death took place in from 8 to 37 hours.

For treatment the authors used uroformine (Hexamethylenetetramine). Of this 15 grammes dissolved in tepid salt solution were injected subcutaneously twice daily. In two cases the injection was given intravenously. While it caused no disturbance it did not appear to act any better than by the subcutaneous path. It is important that treatment should be begun early.

Since death may occur very rapidly the authors attempted to find some means by which the disease could be detected before the development of clinical symptoms by taking the temperatures of the whole stud twice daily, but though some animals showed elevation of temperature they were unable to say that it was an indication of infection. They, however, took the precaution of injecting uroformine and in all cases the temperature returned to normal without any development of clinical symptoms.

As a protective measure all the animals in the particular group where all the cases had occurred were given 10 grammes of uroformine every other day in mash. This brought about a cessation of cases, but subsequently two mares from uninfected premises were introduced on separate occasions on to the infected premises and both contracted the infection.

In their experimental investigation of the disease the authors have avoided intracranial injections as being open to too serious risks and have adopted inoculation into the anterior chamber of the eye.

Inoculating rabbits in series the authors have found that the disease is transmissible to this species, and that a " fixed virus " can be obtained which is fatal in 4 to 7 days. On the other hand, that material derived from diseased horses does not invariably produce the disease in rabbits. The statement made is that of eight rabbits inoculated directly only two became infected. These eight rabbits appear to have been inoculated in two batches of three and five from two cases of the disease.

The symptoms in experimentally-infected rabbits are excitability alternating with depression. The head is extended and there is grinding of the teeth. Just prior to death there are observed tonic contractions involving especially the extensors of the limb.

Histological examinations have been made of the nervous system of one rabbit which died within a few days, and of one which lived for a fortnight.

In the first the most pronounced lesions were found in the pia mater, which was of marked thickness. It was filled with " haemorrhagic infarcts " and infiltrated with cells. Similar cells are found in the superficial layers of the cortical substance and the vessels in the same tissue show a peri-vascular infiltration. The nuclei of the pyramidal cells are excentric in position, and in some of them the chromophile granules are reduced to such fine particles that by Nissl's method the cell body appears to be clear. The choroid plexus was infiltrated.

No cell-inclusions have been detected. In the cerebellum the vessels of the nerve tissue itself show the same changes as those of the pia mater. The lesions found in the rabbit which survived for a fortnight were similar but less pronounced.

In neither case were any bacteria detected in the nerve tissue. In a single experiment an attempt was made to transmit the disease to guineapigs, but without success.

With an emulsion of the brain of a rabbit dead on the fifth day the authors inoculated a horse in the anterior chamber of the eye, and thereby produced infection. The temperature rose on the fourth day. The following day the animal appeared to be normal, but on the following morning it was down and unable to rise. There was evidence of excitement, the animal made galloping movements, and spasmodic movements of the head and neck.

The following day there was marked depression, and it was difficult to produce excitement by stimulation of any kind. Death took place within the next 24 hours.

The lesions found in the nervous system were those described in connexion with the acute natural cases.

An emulsion of the brain of this horse was injected into the anterior chamber of the eye of a rabbit. The rabbit died on the fourth day.

BORDEAUX (E. F. J.). **Bone Disease in Horses. A Clinical Study.**—*Jl. Comp. Path. & Therap.* 1924. Mar. Vol. 37. No. 1. pp. 27–37.

The author's observations lead him to think that dietetic errors which have up to the present been considered the chief cause of osteomalacia are not the only factors involved, and he suggests that it is the inability of certain animals to make full use of the mineral matters even when these are present in the diet. He refers briefly to some half-dozen cases in which the facts appear to suggest that there is an inherited tendency to the disease. The extensive use of bran and barley as a substitute for grass in bad seasons appears to have a distinct effect in causing the condition.

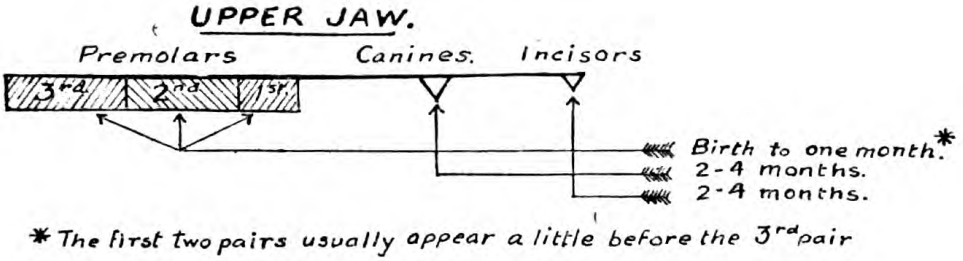
RABAGLIATI (D. S.). **The Dentition of the Camel.**—Egypt. Ministry of Agriculture. 1924. Cairo Govt. Press. pp. 1–32. With frontispiece, 2 graphs and 27 plates. [Price P.T. 5.]

While commanding a large hospital run entirely for the treatment of camels during the war, it was brought forcibly before the author's notice that the available information regarding the ageing of camels was either defective or inaccurate; he therefore set himself to gather as much information as possible on the subject. Since nearly 25,000

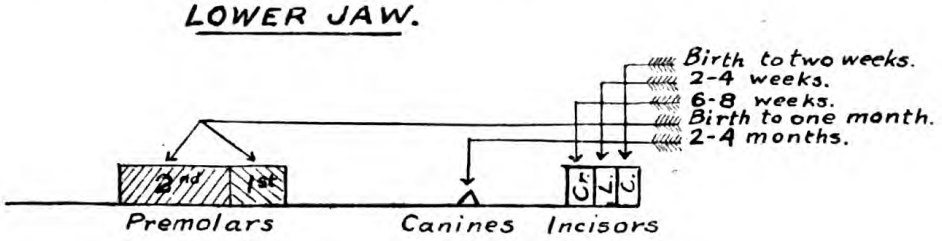
ERUPTION OF THE TEETH OF THE CAMEL SHOWN DIAGRAMMATICALLY.

TEMPORARY OR MILK TEETH.

Dental formula $\frac{1 \quad 1 \quad 3}{3 \quad 1 \quad 2} = 22.$

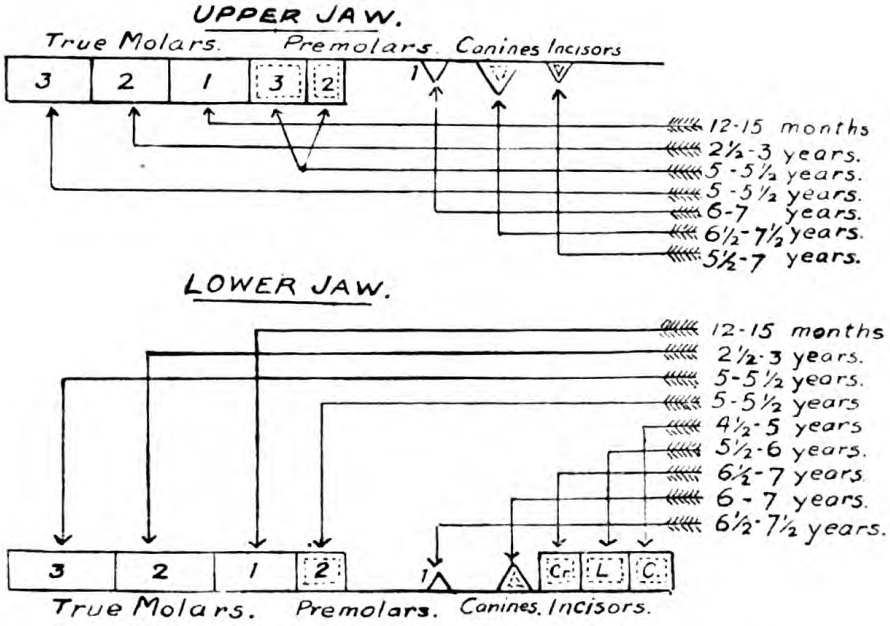


* The first two pairs usually appear a little before the 3rd pair



PERMANENT TEETH.

Dental formula $\frac{1 \quad 1 \quad 3 \quad 3}{3 \quad 1 \quad 2 \quad 3} = 34.$



Note. Teeth shown thus ▭ have temporary predecessors.

[After D. S. RABAGLIATI: "The Dentition of the Camel.]

camels passed through his hands he had good opportunity of gaining valuable knowledge of the subject. The present publication contains the information gathered and with the extremely good plates forms a veritable atlas of dentition in the camel.

An interesting point is referred to in the preface regarding the Arab's method of determining a camel's age. The period of gestation, which is a few days over a year, is counted as a year of life ; a camel is therefore considered by them as being one year old at birth. The author experienced considerable difficulty in finding camels whose age could be verified, as no breeding is carried on by the Government or by individuals upon whose statements reliance could be placed. Opportunity offered, however, of examining the mouths of a number of camels from the date of birth onwards until they obtained full mouths, but it was impossible to keep in touch with them in later life. In the case of camels whose age was definitely known the mouths have been examined every two or three months, and this has been possible in some cases up to six years of age.

The author has had no experience of the two-humped Asiatic camel, but he is of opinion that there is no material variation between the breeds, nor does he think that early maturity hastens the eruption of the teeth.

The teeth probably come through earlier in camels which have to fend for themselves, and apart from this it would appear that the variations in camels' teeth are more marked than in the other domesticated animals. The adult camel has only 34 teeth as compared with the 44 of the typical mammalian mouth. The teeth not represented are the two lateral and two central upper incisors, two upper and four lower premolars.

The camel appears to have no incisors in the upper jaw, but there are three pairs of tushes. The molars number five. In the lower jaw there are three pairs of incisors, two pairs of tushes, and four pairs of molars.

For the better understanding of the subject the author gives a brief but lucid description of the lips, cavity of the mouth, dental pad, hard palate, tongue, and soft palate. The salient points are these. The upper lip is cleft, and each half is independently mobile ; it is prehensile. The lower lip tends to become pendulous with age. There is no muffle. The mucous membrane of the mouth is wholly or in part pigmented and very richly endowed with papillae. The dental pad is very hard and leathery. The tongue is smaller than that of the horse. It can be arched up at the posterior third of the free portion, and the camel has a habit of throwing this over the molar teeth when they are being examined.

The soft palate is long and in the male it is often protruded on each side of the mouth, forming the so-called " bladder " or " qula " of the Arabs.

It is impossible to deal in detail with all the information contained in the author's descriptions of the teeth at different ages, but the above diagrams indicate the changes in the conventional manner, and make them quite clear.

MAURESA (M.) **Hypersensitiveness of Philippine Dogs to Strychnine.**—
Philippine Jl. Sci. 1923. June. Vol. 22. No. 6. pp. 567–580.

The belief has been held that dogs in the Philippine Islands are abnormally sensitive to strychnine, but experiments carried out by

the author indicate that there must be some other explanation of the untoward results obtained in practice as a result of the use of this drug.

WIRTH (P. H.). **Over arsenikhoudende dipvloeistoffen.** [On Dips containing Arsenic.]—*Nederl.-Indische Bladen v. Diergeneesk. en Dierenteelt.* Vol. 35. No. 1. pp. 20–28. [No date.]

One of the difficulties of dipping being the cost, Wirth has studied the local product containing As_2O_3 (named " Warangan "), from which he prepared an alkaline standard fluid containing 60 per cent. As_2O_3 (as Sodium arsenite) and which, by diluting 1 : 250 contains 0·24 per cent. As_2O_3. The price is $1\frac{3}{4}$ guilders (Dutch value) per kilogram, As_2O_3.

Experiments were undertaken to ascertain under what conditions the dip deteriorates (*i.e.*, diminution of the As_2O_3 content by oxidation to As_2O_5, reduction to AsH_3 or absorption by the concrete wall of the bath).

It is shown that faecal pollution reduced the As_2O_3 content to practically nil within a month or a little longer. Addition of ·01–0·05 per cent. of creoline or covering of the surface of the liquid by oil, does not prevent this deterioration. The deterioration is favoured by an alkaline reaction.

In a dipping-fluid containing free As_2O_3 and sodium sulphate the deterioration caused by faecal pollution can be prevented by the combined action of 0·05 per cent. creoline and an oil covering. This is the only dip to be recommended in practice. If an alkaline dip should be judged necessary the fluid should be alkalinized before use and acidulated again afterwards, or the cattle can be given a preliminary dip of an alkaline soap solution, which, moreover, counteracts the pollution of the arsenical dip.*

CALMETTE (A.) **Sur l'utilisation des singes en médecine expérimentale. Le Laboratoire Pasteur de Kindia (Guinée Française).** [The Utilisation of Monkeys in Experimental Medicine.]—*Bull. Soc. Path. Exot.* 1924. Jan. 9. Vol. 17. No. 1. pp. 10–19. With 1 text fig.

The author describes the establishment in French Guinea of a special breeding station for monkeys to be utilized for experimental investigations in connection with diseases that cannot be transmitted to other species. Details are given of the various monkeys which will be available and information is afforded regarding management, etc.

CERNAIANU (C.). **Le Liquide hydatique comme milieu de culture pour les microbes.** [Hydatid Liquid as a Culture Medium for Bacteria.] —*Archiva Veter.* 1923. Vol. 17. No. 415. pp. 85–86.

The author finds that liquid from hydatids can be used as a culture medium in the place of broth or as a basis for agar. It is not coagulated by heat and can be sterilized in the autoclave at 120° C.

* Summarized by Dr. N. H. Swellengrebel.

A list of organisms cultivated is given. The bacillus of fowl cholera appeared to grow less abundantly than in ordinary broth. The bacilli of avian and human tuberculosis do not appear to grow at all on agar prepared with hydatid liquid.

BRASCH (H.). **Versuche über die klinische Verwendbarkeit des Oxydiphenylmethans " Allegan-Bayer " des Wurmmittel.** [Oxydiphenylmethane " Allegan-Bayer " as a Vermifuge.]—*Arch. f. Wissensch. u. Prakt. Tierheilk.* 1923. May. Vol. 49. No. 6. pp. 264–272.

In doses of 0·05 to 0·2 g. per kilog. body weight, Allegan is likely to cause slight swelling and reddening of the mucous membrane of the stomach and duodenum. These doses are well tolerated, and no albuminuria is caused by them in healthy animals. With doses of 0·4 to 0·8 per kilog. severe gastritis and acute parenchymatous nephritis may be caused. Albuminuria and weakness of the hind quarters are sometimes observed. With still larger doses slowing of the pulse, lowering of the temperature and slowing of respiration occur. A dose of 1 g. per kilog. may be fatal in 8 to 10 hours in animals suffering from gastro-enteritis.

Doses of 0·05 g. per kilog. were found to be effective for the destruction of ascarides, Taeniae, oxyurides and ankylostomes. 0·2 g. per kilog. was found to be ineffective against *Mesocestoides lineatus*. The killed worms are to some extent digested and this is not without risk to the infested animals, on account of absorption of toxic materials. Allegan is therefore combined with Istizin (? a purgative). On account of its sharp taste the drug produces an increase in the secretion of saliva and may cause vomition : it is therefore given in capsules. Great caution must be exercised in giving the medicament to cats on account of an apparent special susceptibility. It was found that 10 grammes was too small in two cases in which it was tried on horses.

QUIROGA (S.) **Experiencias sobre un medio de cultivo de origen vegetal.** [Experiments with a Culture Medium of Vegetable Origin.] —*Revista Zootecnica.* 1923. June 15. Vol. 10. No. 117. pp. 161-165.

REPORTS.

TANGANYIKA. **Annual Report of the Department of Veterinary Science and Animal Husbandry. 1922.** [MCCALL (F. J.) Chief Vet. Officer.]—30 pp. With 1 folding map. London : Crown Agents for the Colonies. [Price 3s. 6d.]

During the period reviewed by the report rinderpest was widespread and was the most serious problem to be dealt with. All territory south of the Central Railway was kept clear of it. The disease was generally of a mild type, but there were exceptions among animals which have been free from the disease for some years. The factors in the spread of the disease are illicit movements, infection of common watering places, especially the almost ubiquitous standing water, infection of susceptible game.

The disease has been recognized in the bush buck and wild pig, but these animals do not appear to travel far when infected. Eland, however, travel long distances. It has not been detected in the giraffe, although these animals are known to be susceptible, and they are present in large numbers in the Masai cattle country.

The movement of meat and skins of cattle dead of the disease is partly responsible for its spread.

It is still held that double inoculation is an unsuitable method of control. Serum alone is preferable in small outbreaks which are promptly reported. Quarantine alone would effect the stamping out of the disease if an adequate trained staff were available to ensure early detection and to enforce the rules laid down.

The average dose of the serum supplied from the Kabete Laboratory per animal was 31 cc.

Investigations appear to indicate that East Coast fever is not so enzootic as in Kenya and Uganda.

Dipping is still proving successful in Dar-es-Salaam, where local dairies are making progress. The death rate from East Coast fever among grade and pure bred imported cattle is negligible.

It is hoped to publish a map indicating clean, infected, and endemic areas at an early date.

Fly belts are being defined with greater accuracy and recessions and encroachments detected.

Contagious bovine pleuro-pneumonia has been confined to the northern half of the Arusha district.

Vaccination has yielded disappointing results.

Extracts from the First Preliminary Report of the Veterinary Pathologists, Mpapua, for the year ending December 31st, 1922 :—

The Veterinary Pathologist reports in connexion with the preparation of anti-rinderpest serum that in the process of hyperimmunization the practice of the Germans was to transfuse direct from the carotid of the virus producer to the jugular of the serum-maker. " Apparently they did not practise much re-hyperimmunization." The reason for this was that they considered that the losses due to shock, amounting to 6 per cent., were more than compensated for by the labour saved. But while this is the normal figure for mortality at the first hyperimmunization, it rises with each successive re-hyperimmunization until it becomes prohibitive. Hornby tried the effects of calcium chloride and sodium thiosulphate in reducing this shock, which, although not fully understood, is probably anaphylactic in nature. Of 25 animals hyperimmunized without the drugs, 8 per cent. died. Of 84 which received calcium chloride at the same time as the transfusion, 4·8 per cent. died. Of 57 hyperimmunized, re-hyperimmunized and given the thiosulphate at the same time, 3·5 per cent. died of shock. Concurrently, experiments were made in which the hyperimmunizing blood was transfused into the peritoneal cavity and into the rumen. Carefully controlled tests of the relative titres of the sera produced in the three different ways were carried out. The results indicated that a potent serum can be made by all of these methods or even by drenching a serum maker with virulent blood, but that to get a serum of the same titre relatively more virus would have to be administered. The serum obtained by the intraperitoneal method was at least as good as that obtained by intrajugular injection, and none of the 32 animals hyperimmunized and re-hyperimmunized in this way showed more than transitory symptoms of shock.

The reason for not employing the intraperitoneal route solely is to avoid wounding the serum maker always in the same place. Hornby states that two Europeans, assisted by the necessary boys, can in a morning hyperimmunize 26 animals: 18 intraperitoneally by transfusion, 6 intrarumenally by transfusion, and 2 intrarumenally by gravitation.

Each hyperimmunized is bled 10 days after receiving the fortifying dose at the rate of 5 cc. per lb. body weight. This is repeated weekly until he has been bled five times. The animal is then sent away to recuperate.

The blood is allowed to clot and stand for 24 hours. It then has weights placed upon it and after 48 hours the serum is syphoned off into closed milk churns. It is then carbolized. When not less than 300 litres are available the mixed serum is filtered through charcoal into ordinary sterilized milk bottles.

It has been found that 30 cc. per 600 lb. body weight is sufficient to protect against a simultaneous injection of 2 to 5 cc. of virulent blood. The serum is therefore issued in this dose.

On a number of occasions 3 to 5 times the protective dose of serum has been given to animals a day or two after they have begun to react to a dose of virulent blood. Of 35 animals injected 28 per cent. died. Of 14 controls not injected, 85 per cent.

In a single instance in which some pleuropneumonia virus received from Kabete, Kenya, was used for the inoculation of susceptible cattle entirely negative results were obtained. The fortnight's journey in the hot weather had killed the virus. This indicates that a laboratory prepared vaccine is not likely to yield good results unless used very shortly after preparation.

East Coast Fever.—Tartar emetic, picric acid, and brilliant green were found to be useless for treatment. A native calf severely affected with follicular mange was treated by subcutaneous injection of 2½ per cent. solution of carbolic acid. Six injections of 50–60 cc. were given wherever the lesions were worst. Only a temporary swelling followed the injections and after the last injection no active lesions presented themselves.

JAVA. **Jaarboek van het Departement van Landbouw, Nijverheid en Handel in Nederlandsch-Indië.** 1922. [Annual Report of the Department of Agriculture, Industry and Commerce, Dutch East Indies, 1922.]—1923. 271 pp. Weltevreden: Landsdrukkerij. [Price f. 3.]

Special information concerning the following diseases is to be found in this report :—

Glanders. 10,280 cc. of mallein provided for the ophthalmoreaction. In Surabaya alone 2,743 horses were examined in this way, because it was feared that this port might constitute a focus of infection for other districts not infected till now.

Tuberculosis. 7,911 cc. tuberculine B (for subcutaneous tuberculinization) were provided to the local veterinarians.

Septicaemia haemorrhagica bubalorum. 250,175 cc. antiserum and 90 cc. killed vaccine were provided. The serum is standardized to protect, in 2 cc., a rabbit against 5 times the fatal dose (killing within 20 hours). Veterinarians unanimously reported favourable results with this serum.

Lymphangitis epizootica. Experiments on immunization with Cryptococcus-vaccine yielded no clearly favourable results.

Cholera gallinarum. A beginning was made with the preparation of antiserum.

Anthrax. 81,025 cc. antiserum were issued. An extensive epidemic on the island Roti was brought to a stop by serum treatment. Of vaccine made of the spores of Bac. anthracis (1 million spores per cc.) 4,365 cc. were issued.

Malignant oedema. Experiments in connexion with vaccination were conducted on an extensive scale, 732 animals were vaccinated with mixed serum-vaccine of LECLAINCHE and VALLÉE, 1,042 animals with sterile filtrate of *Bac. oedematis maligni.* In both groups the mortality due to this disease was much less (0·33 and 0·25 per cent.) than among non-vaccinated cattle. A cow immunized with the filtrate 7 months ago was resistant to an infective dose killing a normal animal within 24 hours. In 1922, 58,300 cc. of filtrate, 80,875 cc. of antiserum, and 3,990 cc. of vaccine were distributed among local veterinarians.

Surra. Attention was concentrated on "Bayer 205." Its therapeutic effect on horse-surra was not of lasting value (no relapse after 16 months) except in cases recently infected. No permanent results were obtained in cases of longer duration. As this chemical compound is highly poisonous, with marked idiosyncrasy, no higher doses could be used than ½ gram per 150–200 kilograms on alternate days for 20 days (10 grams altogether). The prophylactic value was well marked in a dose of 1 gram per 150–200 kg. once in 4 weeks. In acute surra among bovines encouraging results were obtained.*

* Summarized by Dr. N. H. Swellengrebel.

TROPICAL DISEASES BUREAU.

TROPICAL VETERINARY BULLETIN.

VOL. 12.] August 31, 1924. [No. 3.

DISEASES DUE TO PROTOZOAN PARASITES.

SERGENT (Edm.), DONATIEN (A.), PLANTUREUX (E.) & DEGUILLAUME (A.). **Notes sur les trypanosomiases (1921-1923).** [Notes on Trypanosomiases (1921–1923).]—*Bull. Soc. Path. Exot.* 1924. Feb. 13. Vol. 17. No. 2. pp. 130–131.

The authors promise a detailed account of the work, of which a brief account is given in this paper, in the *Archives de l'Institut Pasteur d'Algérie.*

The course of Debab.—The average period of incubation is a week and the first symptoms are a sudden rise of temperature associated with the appearance of parasites in the blood. For 3 or 4 months parasites are present in the blood irregularly and their irregularity is reflected in oscillations of the temperature. Death may occur during the acute phase.

If the animal survives, the disease becomes chronic. Parasites appear in the blood at increasing intervals, but their appearance is not associated with any febrile disturbance. During the intermissions, which may last for periods amounting to months, the animals have every appearance of perfect health. Inoculation of large quantities of blood into susceptible animals during intermissions often fails to cause infection. The chronic phase may last for years. Debab exerts an injurious effect in that it decreases the animal's capacity for work, renders it more liable to contract other diseases, and causes abortion. When the chronic phase is well established abortion does not occur.

Tartar emetic injected intravenously in watery solution has yielded results superior (7 cases) to those given by intramuscular injections of the salt in oil (1 case). Atoxyl has been found to be effective but doses bordering on the toxic dose must be used (2 cases). Novarsenobenzol is less toxic. 189, trepol, oxycyanide of mercury, biniodide of mercury, sodium salicylate, sulphate of copper, and quinine have been found to be ineffective in a small number of cases.

Two dromedaries which had passed through an attack of debab became infected when inoculated with *T. brucei.*

Cross immunity tests indicate that *T. marocanum* occurs in equines on the frontier between Algeria and Morocco. The authors point out that it is very advisable to establish the immunity of an animal to one species of trypanosome by repeated inoculations before using it for a cross immunity test with a second typanosome.

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Sheep and goats are less susceptible to trypanosome infections than dromedaries and may acquire not only a protection against them but an actual sterilizing immunity.

Observations show that the latter begins about two years after inoculation, while they acquire a condition of protection from 6 to 18 months after inoculation. The period of absolute immunity is unknown.

Distinction must be drawn between cross protection tests and actual cross immunity tests.

YORKE (Warrington) & MACFIE (J. W. S.). ***Trypanosoma evansi* and *Ornithodorus crossi*.**—*Ann. Trop. Med. & Parasit.* 1924. Apr. 30. Vol. 18. No. 1. pp. 125–126.

In view of the positive results reported by CROSS in the transmission of surra by means of *Ornithodorus crossi*, the authors obtained from CROSS about 200 of these ticks which had been fed upon a dog heavily infected with *T. evansi*.

The ticks had been fed on December 4th, 1922, and were received on January 10th, 1923. They were divided into four batches. Three were placed upon rabbits and one on a guineapig. Ample opportunities were given to the ticks to feed between January and June but none of the animals became infected. The ticks were kept in an incubator at 20° C.

As it was thought possible that the changes of temperature to which the ticks were subjected in travelling to England may have been a determining factor in these negative results, a further batch of ticks which had been fed on an infected dog was obtained during August 1923.

These were divided into two batches and were allowed frequent feeds upon a rabbit. Up to March 1924 infection had not taken place.

In two experiments in which *O. crossi* were fed upon rabbits infected with *T. rhodesiense* the parasites were found in their stomachs in a remarkable state of preservation when the ticks were dissected two months later. They were, however, incapable of infecting a mouse. The same result was obtained when the stomach contents of one of these ticks was used for the inoculation of a mouse on the day following a feed.

VELU (H.), BAROTTE (J.) & BALOZET. **Notes sur la valeur de la ponction du testicule dans la diagnostic de la dourine.** [Puncture of the Testicle in the Diagnosis of Dourine.]—*Bull. Soc. Path. Exot.* 1924. Apr. 9. Vol. 17. No. 4. pp. 298–301.

The authors have taken the opportunity of testing the value of puncture of the testicle for the diagnosis of dourine, as described by NEUMANN and DAHMEN.

They have had at their disposal for this purpose three stallions clinically affected, but they have also carried out observations upon rabbits inoculated from these for the purpose of maintaining the strain of parasites in the laboratory. One of the stallions was a donkey.

The puncture of the testicle was first practised some three months after the animals had become infected. They were at that time shewing clear clinical evidence of infection, and were about to undergo treatment with Bayer 205.

The animals were cast as for castration and the puncture was carried out with needles about 8–10 centimetres in length and ·7 to ·8 mm. in diameter, and was made right into the parenchyma of the organ.

A moderate amount of swelling occurred during the 24 hours following the operation but this subsequently disappeared.

Two moist preparations were made from each animal, and each was carefully searched for 20 minutes. Neither trypanosomes nor spermatozoa were found in any of them. The disappearance of spermatozoa could only have been temporary as a part of the disease.

The rabbits inoculated for the purpose of maintaining the strain were subjected to puncture of the testicles every 10 days, from the time of inoculation until the time of death. The material obtained was examined moist between a slide and coverglass.

In no case were trypanosomes found between inoculation and the first appearance of oedema, but the rapid movements of the spermatozoa which swarmed in the preparations would have in any case rendered it impossible to detect a trypanosome.

During the period between the first appearance of symptoms and the height of the disease, when spermatozoa were gradually diminishing in numbers, one or two trypanosomes could now and then be detected.

Subsequently, while the spermatozoa continued to decrease in numbers trypanosomes could be found with greater frequency, and the examinations were as a rule positive.

Prior to death the genital organs shewed marked swelling and scars.

At this stage trypanosomes were readily found in large numbers in the fluid obtained from the oedemas, from the liquid escaping from the testicles and from the testicles themselves.

Only the systematic examination of materials obtained from the testicles at various stages, followed by histological examination of sections of the organs, could furnish valuable information regarding the invasion of the testicles.

BLANCHARD & LEFROU (G.). **Essais du stovarsol dans la trypanosomiase humaine.** [Stovarsol in the Treatment of Human Trypanosomiasis.]—*Bull. Soc. Path. Exot.* 1924. Mar. 12. Vol. 17. No. 3. pp. 214–216.

The authors give accounts of eight cases of sleeping sickness treated with stovarsol. They found that a single dose of 2·5 to 3 grammes caused a disappearance of the parasites which lasted for about a month. Repetitions of the drug failed to achieve that effect. In fact, the effectiveness of the drug appears to depend upon the size of the dose rather than upon the total amount given.

SEI (S.). **Ueber die morphologischen Veränderungen der Trypanosomen bei Behandlung von Tieren mit "Bayer 205."** [The Morphological Changes produced in Trypanosomes as the Result of Treatment of Infected Animals with "Bayer 205."]—*Zeitsch. f. Hyg. u. Infektionskrankh.* 1923. Sept. Vol. 100. No. 3/4. pp. 416–424.

The author points out that there is still great uncertainty regarding the manner in which drugs produce their effects upon trypanosomes in the animal body, and he summarizes at some length the views that have been published in this connexion.

Effects may be produced by the drug itself, or as a result of reaction on the part of the body to the drug used.

In his own observations he has utilized mice infected with *T. brucei*, *T. equinum*, and *T. equiperdum*, and the doses of Bayer 205 have been minimal, that is to say minimal for curative purposes. They have ranged from ·000025 to ·00003 g. In examination of the blood he has used dried smears stained by Giemsa, holding that by this method, while minute details may be modified, the general form of the parasites is more accurately preserved.

The following observations were made. The effect of the drug is to increase the tendency to multiplication, and multiple divisions of the nucleus are frequently found. The cytoplasm becomes looser in texture and appears swollen. Displacement forwards of the blepharoplast is frequently seen in multiplying forms. Multiplication forms were seen in which one of the daughter parasites was abnormally small, and not infrequently possessed no nucleus. The latter abnormality is sometimes observed in untreated trypanosome infections. Parasites with a long posterior extremity, resembling that seen in *T. lewisi*, have also been found. Degeneration of the nucleus and the appearance of granules in the cytoplasm are also evidences of degeneration which have been encountered.

SERGENT (Edm.), DONATIEN (A.), PARROT (L.), LESTOQUARD (F.), PLANTUREUX (Edm.) & ROUGEBIEF (H.). **Études expérimentales sur les piroplasmoses bovines d'Algérie.** [Experimental Investigations of the Bovine Piroplasmoses in Algeria.]—*Ann. Inst. Pasteur.* 1924. Apr. Vol. 38. No. 4. pp. 273–343. With 42 text figs.

The authors point out that the bovine piroplasmoses or as they are more generally termed the " yellows " are the main obstacle to cattle rearing and improvement in Algeria. This is not only for the reason that they are responsible for serious losses, but they occur chiefly in the best irrigated portions of the colony and thus prohibit the use of some of the best pasture land.

In this long paper are published the results obtained during the last eighteen months. Details of the experiments are to be published in the *Archives de l' Institut Pasteur d'Algérie*, Vol. 2. No. 1. 1924.

As a result of their observations the authors conclude that five distinct diseases due to parasites of the blood corpuscles occur in bovines in Algeria. The parasites are : 1. *Piroplasma bigeminum*, 2. *Babesiella berbera* n. sp., 3. *Gonderia mutans*, 4. *Theileria dispar* n. sp., 5. *Anaplasma marginale.*

Piroplasma bigeminum was obtained in a state of purity from an animal infected at the same time with *A. marginale*, and *G. mutans* by a succession of rapid passages. By this means the short period of incubation of the parasite was put to good account. The strain was obtained pure at the third passage. It is noted that repeated re-inoculation of animals that have passed through an attack leads to a multiplication of the parasites without causing any rise of temperature.

Babesiella berbera n. sp.—This name is used to designate a piroplasm-like parasite belonging to the sub-genus *Babesiella* Mesnil 1919. It differs morphologically and biologically from the other

members of the sub-genus. The strain was obtained in the same manner as *P. bigeminum* from an animal shewing *Babesiella berbera*, *A. marginale*, and *G. mutans*, that is to say by a series of rapid passages through specially imported clean animals. The strain was obtained in a state of purity at the fourth passage and was maintained through ten subsequent passages.

The disease is characterized by a marked rise of temperature from 4 to 8 days after inoculation. The temperature remains up for 4 to 10 days and then the disease passes into the chronic condition. Parasites are discoverable in the blood in small numbers. On an average one per cent. of the corpuscles are invaded. The destruction of red cells ranges from 2 to 4 million per cubic millimetre. In spite of this, haemoglobinuria has been noted in one case out of eighteen.

The disease is a benign one and, would probably escape detection unless the temperature were taken daily. Trypan blue does not appear to be of any value. There may be relapses during the chronic phase of the disease. These are, however, very slight and are characterized only by an increase in the number of parasites in the blood.

Morphology of *Babesiella berbera*.—The authors describe four principal forms of the parasite. These are the anaplasmoid, round, elongated and dividing forms. The rounded forms are the most numerous, the elongated or sub-piriform type is slightly less common, while the others form a small minority. In multiplying a ring-shaped parasite is described as becoming an elongated oval which is subsequently constricted at its centre. At the final stage of division a slender thread of protoplasm joins the two daughter parasites. As many as four parasites have been observed in a single corpuscle.

Passage through bovines leads to no exaltation of virulence. At 24° C. the virus can be preserved in vitro for at least a week.

The sheep is not susceptible to infection, nor does it harbour the virus when inoculated.

Re-inoculation as a rule produces no reaction.

Gonderia mutans has been detected as a pure infection in three animals imported from France. The identity of the parasite was established by inoculation of healthy animals with their blood. The authors figure and describe the morphology of the parasite. They divide the forms observed into anaplasmoid, rounded, elliptical, rod-shaped, and cross-forms.

Theileria dispar n. sp.—This parasite resembles *T. parva* in many respects, but differs from it in that the infection is transmissible by blood inoculation and that anaemia and enlargement of the spleen are constant lesions.

This virus was isolated by successive rapid passages, and was obtained in a state of purity at the seventh passage.

The infection caused by this parasite is marked by an acute phase only. This does not pass into a chronic phase. The period of incubation is 12 to 24 days. The temperature rises rapidly and remains high for a period ranging from 1 to 14 days. During the febrile attack there may be slight remissions of the fever which last for a few hours. As a rule about four days after the initial fever has subsided there is a second rise of temperature which lasts from 1 to 6 days. Two distinct stages are described in the development of the parasite; these are the plasma bodies of Koch, for which the authors use the term "grenade" bodies, and the intracorpuscular forms.

The " grenade " forms are found in the internal organs and may be discovered by puncture. The interval elapsing between inoculation and the appearance of these forms ranges from 13 to 26 days. They are generally discoverable immediately the temperature rises. They disappear when the temperature falls. Punctures made prior to the rise of temperature and after its fall have invariably failed to reveal the presence of the parasites.

In specially severe cases " grenade " bodies may be discoverable in the peripheral blood.

The intra-corpuscular forms appear immediately or within a few days after the " grenade " forms. Sometimes they are present in large numbers from the beginning and at others they are scanty at first, increasing in numbers afterwards.

There is intense anaemia. The loss of corpuscles may amount to 3½ million per cubic millimetre. There is at the same time a leucocytosis.

Clinically the disease manifests itself by dullness and depression, swelling of the eyelids, lachrymation, congestion of the mucous membranes followed by gradual blanching associated with the appearance of petechiae. Rapid wasting, loss of appetite, atony of the rumen, constipation, acceleration of pulse and respiration are also symptoms. The superficial glands are recognisably enlarged, and sometimes haematuria is seen. In the final stages the cerebro-spinal system is involved.

The disease runs its course in about a fortnight to terminate in death or recovery, but death not infrequently takes place while the temperature is still high. Convalescence is slow. Recovery when it takes place is complete, the animals ceasing to harbour the parasite, and an attack confers immunity.

Lesions.—Emaciation, pallor of the muscles and a watery condition of the blood are constant. The heart shews subepicardial and sub-endocardial haemorrhages. The spleen may be as much as five times the normal size, the lymphatic glands enlarged and moist. The mucous membrane of the gastro-intestinal tract is congested, and may present ulcerations measuring up to one centimetre in diameter. The liver is enlarged and has a marbled appearance as a result of the presence of sub-capsular haemorrhages. Jaundice is seen in about 30 per cent. of cases. The kidneys shew congestion and not infrequently infarcts.

The disease occurs in certain parts of the country only, and is seen usually during the hot weather. It is noted that the examination of the glands and spleen for " grenade " bodies is useless six hours after death, as these forms rapidly disintegrate and disappear.

Two forms resembling those described by GONDER in connection with *T. parva* are recognisable. These forms have been found in all the organs at post mortem examination with variable frequence. In examinations made during life they have been found in 15 per cent. of cases in the superficial glands, in 28 per cent. of cases in the spleen, and in 94 per cent. in the liver.

The disease is transmissible to bovines of all ages, and recovery leaves a solid immunity.

The authors have encountered one case of natural immunity in a fifteen months old animal imported from France.

Anaplasma marginale.—This virus was isolated in a state of purity using passage through the sheep as described by LIGNIÈRES.

SERGENT (Edm.), DONATIEN (A.), PARROT (L.), LESTOQUARD (F.), PLANTUREUX (Edm.), & ROUGEBIEF (H.). **Inoculation au mouton de l'anaplasme du bœuf.** [Inoculation of Anaplasmosis from the Ox to the Sheep.]—*Bull. Soc. Path. Exot.* 1924. Apr. 9. Vol. 17. No. 4. pp. 295–298.

The authors have carried out experiments to control LIGNIÈRES' report (1919) that he had been able to transmit anaplasmosis from the ox to the sheep, to carry on the infection in sheep in series, and that in the sheep the blood remained infective for cattle for long periods.

In April 1923 two Algerian sheep were inoculated intravenously with 50 cc. of blood from a calf infected with chronic anaplasmosis. Neither had any rise of temperature, and one of them (No. 56) showed anaplasma-like bodies in its corpuscles 6 months after inoculation.

Two months after inoculation 100 cc. of this animal's blood were injected intravenously into a calf. The calf became infected. Parasites appeared in its blood on the 30th day and the maximum temperature recorded was 40·4°C. Six months after the inoculation blood was taken from the same sheep and injected intravenously in doses of 1, 50, and 100 cc. into three cattle. None became infected during a period of observation of 7 months. Blood was taken from sheep 56 four months after it had been inoculated and 50 cc. were injected intravenously into two sheep (Nos. 20 and 60). Neither shewed any evidence of infection. Sheep No. 20 was bled two months after inoculation, and 50 cc. was injected (intravenously ?) into sheep 38 and 39.

The blood of sheep 38 was injected a month later into two calves in doses of 50 and 200 cc. One was inoculated intravenously. and the other intraperitoneally. Neither showed any evidence of infection. The experiment was repeated as follows. A sheep was inoculated intravenously with 50 cc. of blood from an infected heifer. Approximately 17 per cent. of the corpuscles contained parasites. One month later the sheep was bled and the blood used in doses ranging from 0·1 cc. to 100 cc. for the inoculation of 15 cattle. Only one of these—which had received 50 cc.—became infected. The temperature rose on the 48th day, and parasites were found in the blood. The maximum temperature recorded was 39·7°C. and about 8 per cent. of the corpuscles were found to contain parasites. Marked anisocytosis was observed for three weeks. The animals were under observation for $3\frac{1}{2}$ months.

The authors therefore confirm LIGNIÈRES' statement that the virus can be preserved in the sheep, but not constantly. They have been unable to confirm his statement regarding the transmission of the infection in sheep in series.

LESTOQUARD (F.). **Les piroplasmoses du mouton en Algérie. Note préliminaire.** [Piroplasmoses of Sheep in Algeria. Preliminary Note.]—*Bull. Soc. Path. Exot.* 1924. Feb. 13. Vol. 17. No. 2. pp. 122–128. With 1 text figure.

The author has been able to identify three distinct piroplasms occurring in sheep in Algeria, viz., *Babesiella ovis* Babes, 1892, *Gonderia ovis* du Toit, 1918, and *Theileria ovis* Littlewood, 1914.

Babesiella ovis.—The disease for which this parasite is responsible is characterized by jaundice and haemoglobinuria. Two outbreaks were

detected on farms in humid areas during November and December 1923. The mortality was 5 and 10 per cent. respectively. The usual symptoms of fever are present. There is diarrhoea, which is not infrequently blood stained. Abortion occurs in pregnant animals and lactation is suppressed.

At the post-mortem examination the following lesions are found : Marked jaundice, a variable amount of blood-tinged liquid in the peritoneal cavity, ecchymoses on the heart, enlargement and yellow discoloration of the liver, haemorrhagic enteritis, enlargement of the spleen with sub-capsular haemorrhages, enlargement of the kidneys, with congestion and, sometimes, haemorrhages. The bladder contains a large amount of urine pigmented with haemoglobin. The causal organism is found in all the organs and in the blood.

The disease is transmissible by blood inoculation and the average period of incubation is a week. Fever lasts for five or six days, and parasites appear in the blood at about the time that the temperature first rises. The parasites are scantily present in the blood, only 1 to 6 corpuscles per thousand being invaded. In some cases clinical symptoms are very slight. There is a very marked destruction of the red blood corpuscles associated with a leucocytosis. Recovery leaves immunity. The disease is transmissible to the goat. The parasite is a small one, measuring 1 to 2·5 μ. The majority are ring-shaped with a central vacuole. Pear shaped forms are very scanty. In some cases anaplasma-like forms appear in the blood before the characteristic parasites. For the most part the invasion of the corpuscles is simple ; double invasion being more rare.

Gonderia ovis.—This parasite has already been described by SERGENT, PARROT, and HILBERT. It is of very common occurrence in Algerian sheep, and it does not appear to possess any pathogenic properties. A simple examination of the blood of 202 sheep shewed that 65 per cent. were infected. Repeated daily examinations would probably have revealed the presence of the parasite in all of them. As a rule not more than 1 to 3 per thousand corpuscles contain parasites, which are usually present singly in them.

Theileria ovis.—This parasite has been detected twice, once in an animal imported from France ten months previously, and once in a native animal. The lesions are those generally seen in piroplasmoses, and it is noted that there is marked enlargement of the spleen which is dark in colour, and softened.

Koch's blue bodies are discoverable in smears from the organs. The parasites present in the red corpuscles closely resemble *Gonderia ovis.* Ring-shaped and elliptical forms predominate. Bacillary forms are very rare. The corpuscles invaded number some 2 per cent. In blood from the liver and spleen the figure is a little higher.

SERENA (P.) **Rinderpiroplasmose.** [Bovine Piroplasmoses.]—*Schweiz. Arch. f. Tierheilk.* 1924. Mar. Vol. 66. No. 6.

The author gives more or less full details of 22 cases of piroplasmosis observed by him in cattle in Switzerland. The diagnosis was apparently based upon clinical symptoms only, since no mention is made of the detection of parasites in the blood.

BONNE (C.) **La leishmaniose cutanée dans la Guyane hollandaise.** [Cutaneous Leishmaniasis in Dutch Guiana.]—*Bull. Soc. Path. Exot.* 1924. Apr. 9. Vol. 17. No. 4. pp. 293–295.

In Dutch Guiana cutaneous Leishmaniasis occurs in a number of forms—papular, ulcerative, eczematous, mucous, and leishmaniasis associated with lymphangitis and hypertrophy are described.

All forms, save the last, are cured by intravenous injections of a 1 per cent. solution of emetic in 5 to 10 cc. doses twice a week. Prolonged treatment is required in the hypertrophy form of the disease.

The disease occurs only in the forests in the interior.

ADLER (S.). **An Isospora of Civet Cats.**—*Ann. Trop. Med. & Parasit.* 1924. Apr. 30. Vol. 18. No. 1. pp. 87–94. With 1 plate.

The infection was observed in three civet cats, one adult and two young ones. The infection was fatal in the latter and the adult was killed for examination. The animals passed blood and mucus and a large number of oocysts in their faeces.

Development is confined to the lower half of the small intestine.

Schizonts normally produce 8 merozoites but sometimes only four are found. The nucleus of the merozoite is relatively large, has a distinct nuclear membrane, and contains a large karyosome.

Microgametocytes are distinguishable from schizonts by the fact that they tend to become rounded or elliptical, the schizonts maintaining a gregarine form until they have 8 nuclei; as many as 30 small nuclei can be detected when a microgametocyte measures only 6μ in diameter. The development of the microgametes follows the usual course.

The macrogametes become spherical early in their development, and the nucleus is very large, occupying in the early phases about half the cell. In the specimen examined the proportion of macrogametes to microgametocytes was about 30 to 1.

Fertilization takes place in the host cell prior to the formation of the oocyst-wall. As many as 10 microgametes have been observed in a macrogamete.

The protoplasm of the oocyst contains from 1 to 5 large refractile bodies which are extruded during the first development of the oocyst. These disappear before the development of the oocyst is completed. The first development of the oocyst takes place within the animal body —the oocysts containing 2 sporoblasts are passed out with the faeces. Oocysts passed with unsegmented protoplasm are probably unfertilized as they do not appear to develop outside the body.

Sporozoite formation requires 3 days after the parasites are evacuated. The sporocysts contain a granular residual body which gradually disappears.

The oocysts measure from 19μ to 27·5μ in length by 15·2μ to 24·7μ in breadth. The commonest size is 22·8μ by 19μ. The extreme measurements number only 2 per cent. The parasite most closely approximates to *Isospora rivoltae*, from which it is distinguished by the fact that the oocysts are passed when segmentation has occurred and that it was found impossible to infect 2 cats, 3 kittens, and 2 young dogs. The period of observation was 28 days. The name *Isospora viverrae* n. sp. is suggested.

DIEBEN (Caspar Petrus Antonius). **Over de morphologie en biologie van het rattencoccidium** *Eimeria nieschulzi* **n. sp. en zijne verspreiding in Nederland (Tevens vergelijkend onderzoek van de bekende coccidienopsporingsmethoden).** [The Morphology and Biology of the Coccidium of the Rat, *E. nieschulzi*.] [Thesis.]—119 pp. With 3 plates and 8 figs.

The following is abstracted from the author's English summary :—

The parasite has been found in wild rats (*Mus norvegicus* and *Mus rattus*).

The oocysts measure 18 by 14μ to 26 by 20μ. The cystwall is in 2 layers, and sometimes there is a limited " zone " both inside and outside the wall producing an appearance of 4 layers.

No micropyle has been seen.

Oocysts were collected by the " sugar floatation " method which was found to have the advantages that the oocysts remain intact, there is a clear field of vision, and the sugar solution does not influence the sporulation. Sporulation occurs in the manner described by METZNER for *E. stiedae*, and occupies about 3½ days. The sporozoites emerge from the sporocyst and from the oocyst within an hour in the animal host, and enter epithelial cells. The sporozoites measure 13·4μ by 2·25μ. Schizogony of the first generation is completed in 3 days. The schizonts sometimes shew a special twist. The merozoites vary very greatly in size, ranging from 7·5 to 26μ in length, by 1·5 to 1·8μ in breadth.

Microgametes measure 5·75μ on an average and about 0·7μ in thickness. They have 2 flagella. The period of development from sporozoite to oocyst is 8 days.

The parasite is not transmissible to the mouse, guinea-pig, and rabbit.

KNUTH (P.) & MAGDEBURG (F.). **Ueber Leukozytozoen bei der Hausgans.** [Leucocytozoa of the Goose.]—*Zeitschr. f. Infektionskrankh. parasit. Krankh. u. Hyg. d. Haust.* 1924.

The material described in this paper has previously received brief publication in the *Berlin. Tierärzt. Wochenschrift* (1922. Vol. 38. No. 31).

The parasite was first found in smears from the heart blood, liver, spleen, and peritoneum of a seven weeks old goose. The forms present in the blood were mostly spindle shaped, and appeared to represent sexual forms, while those in the smears from the organs appeared to be asexual.

Occasionally forms were found in smears from the organs, and less frequently in the blood which had the appearance of schizonts. These were included within mononuclear leucocytes. Merozoites numbered up to 18. Subsequently a number of geese were found to harbour the same parasite. Young birds were found to show evidence of illness as a result of the infection and in these both sexual and asexual forms occurred. In older birds which had recovered sexual forms were present in very sparing numbers only.

Observations indicated that the infection lasted from 4 to 6 weeks. Parasites made their appearance suddenly and after a period of multiplication gradually disappeared. Cases were encountered in which birds harbouring the parasite in considerable numbers shewed no evidence of ill-health.

NIESCHULZ (O.). **Amöben aus dem Zahnbelag von Pferden.** [Amoebae from the Teeth of the Horse.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1924. Ap. 25. Vol. 51. No. 1. pp. 41–44. With 1 text fig.

References to amoebae from the mouths of animals are very scanty. The author has found an organism closely resembling *Entamoeba gingivalis* of man on the teeth of a horse.

In the living condition the parasites measured only 7 to 12μ in diameter. No distinction between endo- and ectoplasm could be made out. At 37°C. the parasites were extraordinarily active, but motility was sluggish at room temperature.

SEIFRIED (O.). **Enzootische Typhlo-Hepatitis bei Truthühnern (Amöbiasis).** [Enzootic Typhlo-Hepatitis in Turkeys (Amoebiasis).] —*Berlin. Tierärzt. Wochenschr.* 1924. Feb. 7. Vol. 40. No. 6. pp. 65–66.

The author has found organisms which he considers to be amoebae in the diseased caeca of young turkeys affected with blackhead.

ILLERT (E.). **Kultivierung von Recurrensspirochäten in künstlichen Nahrmedien unter Berücksichtigung ihrer Virulenz für den Menschen.** [The Cultivation of Spirochaetes in Artificial Media, with special reference to their Virulence for Man.]—*Zeitschr. f. Hyg. u. Infektionskrankh.* 1923. Sept. Vol. 100. No. 3/4. pp. 350–356.

The difficulties associated with the maintenance of strains of spirochaetes in mice led the author to attempt to find some artificial medium in which strains might be kept running.

NOGUCHI'S method of cultivating spirochaetes was found to be of little practical value because the parasites could not be kept alive in it for any great length of time. UNGERMANN in 1918 claimed to have overcome this difficulty by obtaining cultures in inactivated rabbit serum to which a small amount of fresh rabbit blood was added. Other investigators have reported regarding this method of cultivation.

In the author's experiments rabbit serum was placed in tubes in quantities of 0·75 to 1 cc. (These small amounts were used on the score of economy.) They were then covered with a layer of paraffin and inactivated by heating to 60°C. for an hour. The serum used should be obtained from young animals and slightly haemolysed serum is quite good for culture purposes, but it has been noticed that in such sera the cultures maintain their vitality for a shorter time. The fresh rabbit blood is added with a pipette immediately before the tubes are used.

Transplantations to fresh tubes were made every 4th or 5th day, and cultures were found to retain their vitality longer when incubated at 30 to 32°C. than at 37°C. In this way the author has been able to carry on two strains through 36 and 25 generations respectively. Only a very small amount of fresh blood was required, and experiments in which the inactivated serum alone was used gave very poor results. Absolute sterility of the serum is essential.

It has been found that the spirochaetes do not require strict anaerobic conditions for growth, and that it is not essential to use a layer of paraffin on the surface of the serum. It has been suggested that the fresh blood which is added is not in the nature of a food material but that it acts as a buffer and maintains a certain hydrogen ion concentration in the medium. The blood can be replaced by pieces of cooked white of egg and the serum can be diluted with normal saline solution in the proportion of 5 to 1. Illert has not been able to distinguish morphologically between the spirochaetes of relapsing fever of European and African origin. Multiplication is by transverse division and the simultaneous division of a single long parasite into three or four parts has not infrequently been seen.

Cultures in which the spirochaetes multiply rapidly and are themselves actively motile infect animals more readily than those in which multiplication is slow and motility sluggish.

The European strain of spirochaetes appeared to lose its pathogenicity for man under cultivation, but the African strain retained its pathogenic powers to the full.

VERGE (J.). **Spirochaetoses aviaires.** [Avian Spirochaetosis.]—*Rev. Path. Comp. et Hyg. Gén.* 1923. Nov. Vol. 23. No. 241. pp. 695–706.

This paper is in the nature of a summary of existing knowledge and appears to contain nothing new.

DISEASES DUE TO METAZOAN PARASITES.

DE BLASI (Dante). **Rapido saggio preliminare per riconoscere gli ovini affetti da uncinariosi od altra malattia anemizzante affine.** [A Rapid Method of making a Preliminary Diagnosis of Uncinariasis and other Allied Infections producing Anaemia in Sheep.]—*Ann. d' Igiene.* 1924. Jan. Vol. 34. No. 1. pp. 30–33.

The author has previously shown that injection of a haemolytic serum into sheep produced two results : (1) A haemolytic action bringing about destruction of a certain number of the red cells ; (2) a " haemocatatonic " action, lowering the resistance to solution of the remaining red cells, as shown by haemolysis taking place in a 0·62 per cent. saline.

The method is applied to estimate the haemolytic action resulting from infection of sheep with *Uncinaria cernua.* Thus, the number of corpuscles per cmm. of the blood of a healthy lamb was found to be 12·5 millions when diluted with 3 per cent. sodium chloride ; in citrate-saline equivalent to 0·62 per cent. salt solution 12·3 millions. The animal was then infected by larvae of *U. cernua* and ova appeared in the faeces 15 days later. On the eighteenth day after feeding the above estimations were again carried out, and in the 3 per cent. NaCl the erythrocytes numbered 12·2 millions, whereas in the citrate-saline they were reduced to 3·2 millions. In the blood of sheep infected with Echinococcus or Fasciola the two counts remained practically normal. The author next applied the test for the purpose of diagnosing uncinariasis. Taking the blood of an infected sheep and mixing it

with the citrate-saline in a Thoma-Zeiss pipette and shaking, the cells were haemolysed and the fluid became a clear rose colour. The test can be even more readily carried out by withdrawing a drop or two of blood from the ear with an ordinary capillary pipette and placing it in a tube containing the citrate-saline. In the case of an uninfected animal the fluid remains turbid, no haemolysis occurring. The method is a simple one, rapidly carried out, and it forms a ready means of separating the infected members of a flock, confirmation being made by a faecal examination before treatment is undertaken. If it proves as satisfactory in other hands the test will certainly obviate the tedious work of making a large number of faecal examinations, many of which may be negative.*

ADLER (S.). **Ancylostomes in a Leopard.**— *Ann. Trop. Med. & Parasit.* 1924. Apr. 30. Vol. 18. No. 1. p. 128.

In a brief note the author records the recovery of six specimens of *A. braziliense*, Gomez da Faria 1910, from a young leopard in Sierra Leone. Eleven specimens of *A. caninum* were also recovered.

THIROUX (A.). **Sur un procédé destiné à empêcher l'infestation du sol par les larves d'ankylostomes dans les pays chauds.** [A Method of preventing the Infestation of Soil by Ankylostome Larvae in Hot Countries.]—*Bull. Soc. Path. Exot.* 1924. Apr. 9. Vol. 17. No. 4. pp. 303–306.

The objection to burning the faeces of persons infected with ankylostomes for the destruction of the eggs is that it requires so large an amount of wood for the purpose. The faeces of 400 coolies require about 3½ cwt. of wood.

It was at one time thought burying faecal matter was sufficient because the larvae were unable to come to the surface. This, however, is now known to be ineffective in most countries. It was found by PAYNE that in sandy soil larvae buried at a depth of a yard could reach the surface. It was further found that this could be achieved whether the eggs were buried before hatching or not. The number of larvae reaching the surface is indirectly proportional to the depth. In red clay containing a little sand larvae were found to reach the surface from a depth of about 9 to 10 inches, and in pure clay migration did not occur at a depth greater than 6 inches.

PAYNE'S further observations showed that ants and earth worms also bring a small number of larvae to the surface.

The mission of which PAYNE was a member came to the conclusion that the best means of combating soil infestation was the reduction in the number of carriers by mass treatment.

In 1918 SERGENT & LHÉRITIER described a method in which two hermetically sealed trenches of reinforced concrete were used; one being in the process of filling while in the other fermentation was taking place. Each process required about 10 days. The material removed after fermentation was used for agricultural purposes and no fly larvae ever developed in it.

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* Summarized by Dr. H. Harold Scott.

ROUBAUD showed in 1915 that the larvae of flies were killed in a fermenting dung heap by a temperature of 50° C. in 3 minutes, and in 4 to 5 seconds by a temperature of 60° C.

Making reference to BECCARI'S work on similar lines, Thiroux concludes his paper by suggesting that a similar method might be applied for the destruction of ankylostome larvae.

MARTIN (M. A.). **L'évolution des Ascarides; la pneumonie ascaridienne.** [Pneumonia due to the Development of Ascarides.]—*Rev. Vét.* 1924. Feb. Vol. 76. No. 2. pp. 69–76.

This article is a summary of existing knowledge regarding the migrations of ascarides in the body in the course of their development.

PILLERS (A. W. N.). *Ascaris lumbricoides* **causing Fatal Lesions in a Chimpanzee.**—*Ann. Trop. Med. & Parasit.* 1924. Apr. 30. Vol. 18. No. 1. pp. 101–102.

The female chimpanzee died a few days after arrival in this country. There was no definite history. The following lesions were found :— Icterus of the skin, and slight inflammation of the mucous membrane of the small intestine in which were found 63 specimens of *Ascaris lumbricoides*. These ranged from 6·5 cms. (males) to 15·75 cms. (females) in length.

The right lobe of the liver contained three abscesses, each having within it a degenerated worm measuring 9 cms. in length. In the left lobe was a partially degenerated female about 13 cms. in length which appeared to be lying in a bile duct. Six partly decomposed worms were found at the junction of the cystic and hepatic ducts.

THORNTON (H.). **The Relationship between the Ascarids of Man, Pig and Chimpanzee.**—*Ann. Trop. Med. & Parasit.* 1924. Apr. 30. Vol. 18. No. 1. pp. 99–100. With 2 text figs.

The author has examined specimens of *Ascaris lumbricoides* obtained from Accra, *Ascaris suilla* from pigs killed in the Liverpool abattoir, and a few ascarides from a chimpanzee, and concludes that since no morphological differences can be detected the parasite of the pig and chimpanzee should be designated *Ascaris lumbricoides*, Linn.

BOUGERT (J.) & HOCK (R.). **Aorten-Würmer.** [Worms from the Aorta.]—*Zeitschr. f. Infektionskrankh. parasit. Krankh. u. Hyg. d. Haust.* 1924. March 24. Vol. 26 (no. not given). pp. 116–126. With 1 plate.

The author refers to previous publications regarding the occurrence of worms in the aorta of buffaloes which have appeared in the course of the last 30 years. He then describes lesions found in a buffalo imported from the Philippines.

There was found dilatation of the aorta in the posterior thoracic part. On division the wall was found to be 12 mm. thick at the thickest part, and this gradually decreased in the backward direction. The lumen of the vessel was filled with red clots, which when they were removed exposed a brownish grey clot about 140 mm. in length and containing a tangled mass of worms. There were also found six rounded

prominences projecting into the lumen of the vessel. These were about 12 mm. in diameter and 7 mm. high. They were firmly attached to the vessel wall and had an irregular distribution. From each of these nodules there projected a worm, but in no case was it from the summit. The worms emerged at the junction of the nodule with the arterial wall, and on the distal side. The two largest worms were 105 mm. long and 2 mm. thick.

There were, in addition to these, a number of much smaller worms attached to the surface of the nodules, to the surface of the blood vessel and in the substance of the clot.

The dilated portion of the vessel measured 170 mm. in length, and when laid open flat 91 mm. across.

The interior of the vessel showed long wrinkled ridges and depressions.

The thickening of the vessel wall mainly involved the tunica media, and it varied in extent from place to place. On section one of the nodules was found to be very hard, but it did not appear to be at all calcified. Examination of sections showed that where the thrombus was attached to the vessel wall the intima was absent and that organization of the thrombus was taking place. It showed no evidence of stratification. Sections of the worm could be found in the interior of the lesion. At places free from thrombus the intima was thickened. In the media the elastic fibres which are normally present in large amounts in the aorta of the buffalo were largely replaced by fibrous tissue. Blood corpuscles were present scattered through this tissue, and the general appearance presented was that of an early stage of aneurism formation.

Examination of the blood, liver, spleen and kidneys failed to reveal any other worms or embryos.

The author concludes that the worm is not a true blood parasite, since it nourishes itself from the vessel wall.

According to RAILLIET the worm presents characters which resemble those of Onchocerca, and it has therefore been placed in the subfamily " Elaeophora " of this genus.

LEBASQUE. **Rupture de l'aorte postérieure d'un chien consécutive à la spirocercose.** [Rupture of the Posterior Aorta in a Dog as a Result of Spirocercosis.]—*Rec. Méd. Vét.* 1924. Feb. Vol. 100. No. 4. pp. 122–123.

The dog was 4 months old and came under observation on account of its general poverty of condition and of marked weakness of the hind quarters. There was no evidence of distemper. As worm parasites are of common occurrence in Beyrout (where the case recorded was encountered) the puppy was kept under observation for these. Before a definite diagnosis could be arrived at the dog died. Prior to death, for about an hour, dyspnoea and tremors were noticed.

Death was found to be due to rupture of the aorta following atheromatous degeneration brought about by the invasion of the artery by *Spirocerca sanguinolenta*. The posterior aorta showed, in its thoracic portion, seven tumours due to spirocerca. These, which were visible from the exterior of the vessel, were about the size of peas. One of the larger " tumours " was responsible for the haemorrhage. An adult spirocerca was found in each of the lesions. The oesophagus and stomach showed no evidence of invasion by parasites.

In tropical countries weakness or paralysis of the hind legs in the dog should always, in the absence of recognisable cause, lead to the suspicion that spirocerca may be responsible.

SOUTHWELL (T.) & ADLER (S.). (i) *Ophiotaenia marenzelleri.*—*Ann. Trop. Med. & Parasit.* 1924. April 30. Vol. 18. No. 1. p. 129.

The authors record the discovery of a specimen of *Ophiotaenia marenzelleri*, La Rue 1911, in the intestine of *Causus rhombeatus* in Freetown, Sierra Leone.

(ii) *Zschokkeella guineensis.*—*Ibid.*

They also record the detection of *Zschokkeella guineensis* (Graham, 1908) in the intestine of a ground pig (*Thrinomys swinderianus*).

ROUBAUD (E.) & PÉRARD (C.). **Etudes sur l'hypoderme ou varron des bœufs ; les extraits d'oestres et l'immunisation.** [*Hypoderma bovis*. Extracts of the larvae, and Immunization.]—*Bull. Soc. Path. Exot.* 1924. Mar. 12. Vol. 17. No. 3. pp. 259–272.

As has been the experience of other investigators, Roubaud and Pérard have obtained very poor results in their attempts to hatch flies from the larvae emerging from the skin. From over a hundred larvae, a good number of which formed pupae, only 3 or 4 flies have been obtained. From the context it appears that the larvae used had not made their exit from the skin spontaneously, but had been pressed out. The experience of other investigators appears to indicate that this in itself is a factor adverse to the obtaining of the imago. This failure to obtain flies has prevented the authors from carrying out some of the experiments that had been designed, and they therefore concentrated their attention upon the question of the apparent immunity possessed by young animals and those of mature age as compared with animals from 2 to 4 years of age. Statistics collected in the abattoirs of Paris show that 78 per cent. of infested animals are between 2 and 4 years old, 11 per cent. are from 1 to 2, and 11 from 4 years upwards. On the other hand, CARPENTER and STEEN in Ireland found that the majority of infested animals were about a year old, calves coming next in order of frequency. It has also been observed that animals under 4 years of age are usually far more heavily infested than aged animals. The differences observed in the infestation of animals at different ages are referable to the difference in age at which they are sent to pasture and the long period of development of the parasite. There appears to be evidence that the comparative freedom of adult animals from infestation is in some way connected with an acquired immunity, and a similar series of facts has been shown in the case of another parasite, *Cordylobia anthropophaga*. In the case of Hypoderma the authors think that this immunity may result from the absorption of the tissues or secretions of larvae which fail to achieve their full development. The possibility of immunizing cattle experimentally against Hypoderma has suggested itself to the authors and they have carried out experiments with extracts of third stage larvae. In view of the difficulty of obtaining these larvae they have carried out a parallel set of experiments with *Gastrophilus intestinalis*. This parasite is readily obtainable. Extracts prepared with water and with glycerine have been used.

The extracts of Hypoderma have been found to be relatively non-toxic for rabbits, guinea-pigs, rats, and mice.

Only one experiment appears to have been carried out with a bovine animal. This was given a series of subcutaneous injections of extract of third stage larvae after filtration. They have not observed any immediate reaction nor any evidence of anaphylactic shock. It is noted that the animal used had not previously been infested naturally. Reference is made to the results obtained by HADWEN, BRUCE and BRODERSEN.

In their experiments with extracts of Gastrophilus the authors have found, as has DE KOCK, that unfiltered extracts are markedly toxic for laboratory animals, while filtered extracts produce no such effects. In all the experiments carried out freshly prepared extracts appeared to be more active than extracts which had been desiccated. An attempt has been made to immunize two bovines, one with Hypoderma extract and the other with Gastrophilus extract. These animals have been exposed to natural infection, but the authors have no information as to the results.

Experiments designed to show whether small animals acquired any immunity as a result of injection of extracts failed owing to bacterial infections. These animals had larvae of the first or second stage introduced under the skin.

GROOTFONTEIN SCHOOL OF AGRICULTURE. **Destruction of Blow-fly Maggots : an Experiment.**—*Jl. Dept. Agric.* Pretoria. 1924. April. Vol. 8. No. 4. pp. 416.

The object of the experiment was to ascertain how many blowflies breed in a carcase of a sheep left out on the veld and not properly disposed of. On the tenth day after the carcase had been left out a gauze cage was placed over it and the flies were caught as they emerged. It was surprising to find that although an immense number of maggots had been observed, only 500 flies were caught. When emergence of flies ceased the carcase was examined and hundreds of small brown pupal cases which had not opened were found. These on examination were found to be full of the pupae of another insect, the average number present being about 30. Over 60 per cent. of the blow-fly maggots had thus been destroyed. After a further three days the flies began to emerge from these pupae. The species has not been definitely determined, but it is thought to be *Mesocomys pulchriceps*, belonging to the family Chalcididae. Little is known about it, but it appears to assist in combating the blow-fly pest.

YORKE (Warrington) & MACFIE (J. W. S.). **The Action of the Salivary Secretion of Mosquitos and of** *Glossina tachinoides* **on Human Blood.**—*Ann. Trop. Med. & Parasit.* 1924. Apr. 30. Vol. 18. No. 1. pp. 103–108.

The authors find that an emulsion of the salivary glands of *Anopheles maculipennis* agglutinates the red corpuscles of man, donkey, rabbit, and dog. It has no such effect upon those of the mouse, guinea-pig, and cercopithecus sp. The agglutinin is readily destroyed by heat, and heat also caused agglutinated red cells to become completely dissociated.

Similar emulsions of the salivary glands of *Culex pipiens*, *Theobaldia*

annulata, *Stegomyia fasciata*, and *Glossina tachinoides* do not agglutinate red cells from human sources, and *A. bifurcata* and *Stegomyia fasciata* do not agglutinate the red corpuscles of any of the animals mentioned. The emulsion from the glands of *A. maculipennis* and *G. tachinoides* exerted a definite anti-coagulating effect.

MORISHITA (K.O.R.). **A Pig Nematode, *Gnathostoma hispidium*, Fedchenko, as a Human Parasite.**— *Ann. Trop. Med. & Parasit.* 1924. Apr. 30. Vol. 18. No. 1. pp. 23–26.

THEILER (G.). **On the Anatomy of *Taenia festiva*, Rudolphi, 1819.**— *Ann. Trop. Med. & Parasit.* 1924. Apr. 30. Vol. 18. No. 1. pp. 3–13. With 7 text figs.

——. **On the Classification of the Cestode Genus Moniezia (Blanchard 1891).**— *Ann. Trop. Med. & Parasit.* 1924. Apr. 30. Vol. 18. No. 1. pp. 109–123. With 12 text figs.

ERRATUM.

Vol. 12, No. 2, p. 56, LANE summary, line 10, for "symmetrical" (bursa of Heligmosomum or Nippostrongylus) read "asymmetrical."

BACTERIAL DISEASES.

GMINDER (A.). **Zur Frage der Bekämpfung des ansteckenden Verkalbens.** [The Control of Contagious Abortion in Cattle.]— *Zeitschr. f. Infektionskrankh. parasit. Krankh. u. Hyg. d. Haust.* 1924. March. Vol. 26. (No. not stated.) pp. 87–100.

Vaccination must only be carried out in conjunction with laboratory investigations as to the state of affairs in the herd regarding the degree of dissemination of the disease. Hygienic measures must be enforced.

EMOTO (O.). **Further Studies on the Nature of Lumbar Paralysis in the Goat.**— *Jl. Jap. Soc. Vet. Sci.* 1924. March. Vol. 3. No. 1. Author's English Abstract, pp. 66–67.

The author has isolated the streptococcus which he has previously described as being the cause of this disease from 24 cases. The organism is small, occurs in pairs or short chains, is Gram-positive, and does not grow well upon artificial media. Haemolysis is caused in blood agar with the production of clear zones. The organism ferments the principal sugars. Twenty goats inoculated intraspinally with cultures showed anatomical and histological changes similar to those found in natural cases, more particularly if the animal's resistance was lowered by bleeding, or the intravenous injection of serum obtained by immunizing rabbits against tissue from the central nervous system of the goat. "Satisfactory" results were obtained in agglutination, complement fixation, and precipitin tests. The name *Streptococcus caprinus* is suggested.

GRIFFITHS (J. A.). **Necrotic abomasitis in Cattle.**—*Vet. Jl.* 1924. May. Vol. 80. No. 5. pp. 200–201.

The cases occurred among yearling heifers in the Highlands of Nyasaland. As two of the animals had died within two days of being dipped arsenical poisoning was suspected.

One of the animals which was ill had a temperature of 104·8° F. and respiration was slightly accelerated. Slaughter was decided upon. All the organs were apparently normal save the abomasum. This showed an area of necrosis of the mucous membranes about 6 inches in diameter. The muscular coats at the site of the lesion were black in colour and there was localized peritonitis. Analysis for arsenic was negative. Bacillus necrosis was found in the lesion. An animal which had died some hours earlier was examined and a similar lesion found.

WHITWORTH (S. H.). **The Influence of Hydrogen ion Concentration on the Biology of the Anthrax Organism.**—*Thesis presented to the Veterinary Faculty of the University of Zurich.* 1924. pp. 1–130.

This thesis is divided into two parts, viz., an introductory portion containing a general account of the theory of hydrogen ion concentration, its application to the preparation of culture media, and the limits of concentration which permit growth to take place. The second part, comprising about a hundred pages, contains the account of the author's own investigations. The nitrophenol indicators described by MICHAELIS were used in determining the pH values of the media.

Only very slight changes were observed in media during and after sterilization between pH 6·8 and 8·4. The changes above pH 8·0 were associated with precipitation, particularly in highly buffered media. Generally speaking, the following conclusions were arrived at regarding the influence of the H-ion concentration upon the growth of the anthrax bacillus. The range for growth in broth and on agar is pH 6·4 > pH 8·4. While in broth the optimum pH is from 7·8 to 8·1, on agar the range is pH 7·5 to 7·8.

Individual spores show special adaptability to grow in acid or alkaline media. Provided the media be not too alkaline a good growth may be obtained. This is possibly due to a lowering of the pH value by acid produced during growth.

Delay in sporulation results from the use of excessively acid or alkaline agar.

The power to grow in media of low pH value was lost by subculturing in similar media.

During growth the bacillus of anthrax produces acid.

The heat resistance of anthrax spores is influenced by the pH of the medium in which they are suspended. The optimum pH for resistance at 85° C. is pH 7. On either side of this value the resistance decreases, but it is more marked on the acid side.

The resistance of individual spores varies, even when the medium has a low pH value.

VILJOEN (P. R.). **Anthrax. Its Nature and Control.**—*Jl. Dept. Agric.* Pretoria. 1924. March. Vol. 8. No. 3. pp. 276–285. With 4 text figs.

The object of this paper is to set out the main points to be borne in mind when methods of combating anthrax are being carried out.

The disease has become a serious menace to stock in South Africa, and the Government are distributing anthrax vaccine free of cost to stock-owners. It is estimated that the cost of this is at least £30,000 per annum. Anthrax has spread to a very marked extent during recent years. The greater prevalence of the disease during the summer—at least among horses—is due to the increase in the number of horse-flies.

The main biological characteristics of the organism are described in simple language so as to lead up to the question of combating the disease. There then follow descriptions of the symptoms and lesions and these are followed by paragraphs relating to diagnosis.

Two main factors are concerned in the control of the disease : (1) The proper disposal of carcasses, and (2) keeping animals away from infected parts of farms or the use of reliable methods of protective inoculation.

While protective inoculation will reduce immensely the incidence of anthrax, it is not possible by its means to confer complete immunity in all instances. The reasons for this are as follows :—(1) A few individuals will not respond to vaccination, (2) local difficulties may prevent all the animals being properly inoculated, (3) the immunity is relative and may break down if a very large dose of infective material be swallowed, (4) multiplicity of strains may be responsible for incomplete immunization, (5) variations in susceptibility.

BÉGUET (M.). **L'agglutination des *Brucella melitensis* et le séro-diagnostic de la fièvre ondulante. Causes d'erreur et précautions nécessaires.** [The Agglutination of *Brucella melitensis* and the Serum Diagnosis of Undulant Fever. Causes of Error and the Necessary Precautions.]—*Bull. Soc. Path. Exot.* 1924. Feb. 13. Vol. 17. No. 2. pp. 110–114.

The author has found that different strains of *Br. melitensis* vary greatly in their power of producing agglutinins in the blood of animals experimentally infected.

Their experiments have been carried out with 17 strains of *melitensis* and 3 of *abortus*.

These differ more or less among themselves as shown by cross agglutination tests, but the results do not permit of the recognition of definite groups among them.

In cross agglutination tests heating the serum to 56° C. for 30 minutes has little or no effect upon the agglutination when the emulsion used is prepared from the strain used as antigen in the preparation of the serum or from one closely resembling it. There is, however, a distinct lowering of the agglutinating power when the emulsion is prepared from a markedly different strain : a serum which possesses a weak agglutinating power for a particular strain may lose that power entirely on heating. In one case the agglutinating power was higher after heating than before. This the authors consider as a paradoxal reaction similar to that seen when a strong dilution of serum causes less agglutination than a weak one. The suggestion is put forward that heating destroys some anti-agglutinating substance that is present.

They have not been able to differentiate *B. abortus* from *melitensis* either by experimentally prepared anti-sera or by sera from natural cases of undulant fever.

The strains of organisms have been used for tests of 150 sera from healthy persons or from persons suffering from diseases other than undulant fever. One hundred and forty-two of these have shown agglutinating power ranging from 1 in 20 to 1 in 500 for the strains of *melitensis*. Heating has in most cases destroyed this power. It was possible to grade the various strains of *melitensis* according to their agglutinability by non-specific agglutinins ranging from most susceptible to least susceptible, but this was not possible with specific agglutinins. Extensive and prolonged experiments will be necessary to determine whether strains become modified during artificial cultivation.

HUBER (F. L.). **Over de immunisatie tegen septicaemia haemorrhagica in het bijzonder bij den indischen buffel.** [On Immunization against Septicaemia haemorrhagica, especially of the Indian Buffalo.]—*Nederl.-Indische Bladen v. Diergeneesk. en Dierenteelt.* Vol. 34. No. 6. pp. 402–427.

This is the first of a series of papers and deals with the previous publications. Although it would seem to lie outside the scope of this Bulletin, which mentions original articles only, it may be useful to give an abstract of the part dealing with the Dutch East Indian researches.

On the suggestion of DE BLIECK, experiments were undertaken to immunize buffaloes against the "barbone" or bovine septicaemia, caused by *Bacillus bipolaris septicus* var. *bubalisepticus*, belonging to the group of Pasteurella, well known by PASTEUR'S classical experiments on immunization against chicken-cholera. A preliminary experiment was performed in 1910 to test the harmlessness of the vaccine. SMIT in Tjibaroesa (Buitenzorg) immunized 1,600 buffaloes, each with 1 c.c. of vaccine (prepared by killing a broth-culture at 55° C.), combined with 10 c.c. of immune-serum, 5 animals becoming ill in consequence of the treatment; the cultures were heated at 65° C. for an equal time.

In 1911 SMIT & BUBBERMAN used a vaccine prepared by rinsing with saline the surface of an agar-culture aged 48 hours and subsequently killing this suspension by heating it 1 hour at 55° C. Twenty buffaloes were immunized with 2–3 c.c. of the vaccine. Four months later they proved to be resistant against a lethal dose of a highly virulent strain. During the period June–October, 1912, VERMEER, in the Bantam residency (Java), used 5,000 c.c. of this vaccine to immunize 3,548 buffaloes. With the exception of 7 which, apparently, had become infected before the beginning of the experiment, the disease becoming apparent 3 days after the injection, all the animals remained healthy up to January 1st, 1913. Serum of highly immunized animals was also used with advantage. It confers an immunity lasting for 3 weeks only and it is to be injected in doses of 20 c.c. (preventive) or 50–100 c.c. (curative).

Much stress is laid on the necessity of preparing the vaccines (or immunizing the animals producing the sera) with as many local strains as possible, preferably using in each epidemic the particular strain causing it.*

*Summarized by Dr. W. H. Swellengrebel.

DISEASES DUE TO FILTERABLE VIRUSES.

DU TOIT (P. J.). **Horse-sickness in 1923.**—*Jl. Dept. Agric.* Pretoria. 1924. Apr. Vol. 8. No. 4. pp. 370–382.

The year 1923 was one of the worst seasons for horse-sickness experienced as yet. As the rainfall was heavy a bad season was expected, but it proved to be far worse than was anticipated. The mortality reached its highest point during March. Reports were received regarding the deaths of a number of donkeys during the season, but while the figures tabulated suggest that horse-sickness was the cause of death, there is no actual evidence that this was so. It has generally been held that while donkeys will react to an injection of virus, death does not as a rule occur in that species.

Steps were taken to ascertain what was the mortality among the horses inoculated in 1922, and the figures indicated that 17·6 per cent. of these died. It is to be noted that in making the statistics the whole number of horses, mules, and asses dying during the horse sickness season were assumed to have died of horse sickness. The figures given are therefore in all probability too high. Twenty-nine per cent. of the horses inoculated during 1922 showed relapses and recovered. There is a body of opinion among the farmers that inoculated horses which relapse will recover if they are properly cared for and that the immunity possessed by inoculated horses is stronger than that resulting from natural salting. It is not thought that inoculation has any effect upon the animals' stamina. At the Government farm at Kaalplaats, a bad farm for horse sickness, the percentage of deaths and of relapse with recovery was approximately the same as in the whole country. Also hyperimmune horses were attacked in about the same proportion as immune horses.

FROSCH & DAHMEN. **Die Entdeckung des Maul- und Klauenseuche-erregers.** [The Discovery of the Cause of Foot and Mouth Disease.]—*Berlin. Tierärzt. Wochenschr.* 1924. Apr. 10. Vol. 40. No. 15. pp. 185–187.

The following is abstracted from an abbreviated account of a meeting of the Berlin Microbiological Society held on April 7th, 1924, published in the above Journal.

The discovery of the causal organism of foot and mouth disease was the result of some photographic investigations carried out by Frosch. In these experiments ultra-violet light was used, and in photographs of diluted vesicular fluid taken by its means the small rod-shaped organism was discovered. These are slightly longer than they are broad and measure about 0·1μ in length.

This discovery led to attempts on the part of Dahmen to cultivate the organism. He concentrated his attention upon obtaining cultures on solid media because of the uncertainty attaching to the use of liquid media in appraising turbidities produced in them. Dahmen held that the fluid from vesicles probably exerts a noxious effect upon the virus since in his view it is a reaction product of the body for the purpose of destroying the virus. He therefore took steps to separate the virus, which in his opinion must be particulate, from the liquid in which it occurs. This separation was achieved by centrifuging. With the material sedimented Dahmen was able to obtain cultures on solid

media. The colonies were about the size of a red blood corpuscle and consequently were invisible until magnified. By means of these cultures guinea-pigs were infected and success in this respect was achieved with cultures which had passed through a number of generations (26).

MANOUELIAN (Y.) & VIALA (J.). **"Encephalitozoon rabiei" parasite de la rage.** [*Encephalitozoon rabiei.* The Parasite of Rabies.]—*Ann. Inst. Pasteur.* 1924. Mar. Vol. 38. No. 3. pp. 258–267. With 4 plates.

The authors figure and describe in the central and peripheral nervous systems, and in the salivary glands of human beings, dogs, rabbits, and monkeys, bodies which they identify as the causal organism of rabies.

For many years the authors have noted variations in colour and structure of Negri bodies stained by Mann's method, and these they consider are due to degenerative processes in them.

They have succeeded in obtaining clear pictures of their parasite only by strict attention to the method of fixation and staining employed.

The fixing solutions to be used are a modification of Gilson's and Dominici's.

The Gilson mixture contains equal parts of acetone, choloroform and glacial acetic acid to which an excess of perchloride of mercury is added. Immediately before use a strong alcoholic solution of iodine is added with constant stirring until the liquid acquires a deep mahogany tint.

Dominici's solution is prepared immediately before use as follows :— Tincture of iodine is added drop by drop to a saturated solution of perchloride of mercury until an orange colour is produced. To 100 volumes of this are added 12 volumes of formalin and 5 of acetic acid. The orange colour must be preserved by the addition of the requisite amount of tincture of iodine.

Fixation requires from 2 to 24 hours and the pieces of tissue are passed through alcohol or iodised acetone prior to embedding. It is advised that they should be embedded in celloidin before being passed into paraffin.

Staining is effected by immersing the sections in a solution composed of 35 cc. of 1 per cent. aqueous methyl blue, 45 cc. of 1 per cent. aqueous eosin and 100 cc. of distilled water. The slides are kept in this for 24 hours at room temperature or for a shorter time at body temperature.

After rapid washing in tap water and dehydration with alcohol the slides are treated with absolute alcohol rendered faintly alkaline with caustic soda (30 cc. with 10 drops of 1 per cent. caustic soda). When the sections become red they are washed with alcohol to remove the soda. They are then placed in tap water until they assume a bluish tint, and then placed in water containing 2 drops of acetic acid per 40 cc. After one minute they are dehydrated, cleared in xylol and mounted in balsam rendered acid with salicylic acid.

Moist fixation may be applied to smear preparations. Haidenhain's haematoxylin, Giemsa, polychrome methylene blue, and a mixture of eosin and toluidene blue have yielded good results.

The clearest pictures of the bodies which the authors consider to be the parasite of rabies have been found in the pyramidal cells of the hippocampus. Where stained by Mann's method the bodies acquire a

bright red colour. They are fusiform in shape and measure 1 to 2μ in length. In their interior there are granules and threadlike structures which stain blue. The bodies may be numerous or scanty in the cells, and they may be found in the dendrites lying parallel with the long axis.

Negri bodies may be found in cells occupied by the parasite and they may be recognised in a specimen stained by Mann's method by their orange tint and by their round or oval shape.

It is admitted that transition forms between the two may be made out. In fact, in the authors' opinion Negri bodies result from the degeneration of masses of the parasites. This is a special reaction of the nerve cell, for though the parasite is encountered in the cells of salivary glands, Negri bodies are not encountered there.

NEVEU. **Sur un case de rage.** [A Case of Rabies.]—*Rec. Méd. Vét.* 1924. Apr. 30. Vol. 100. No. 8. pp. 179–180.

The author describes a case of rabies in a dog in which the only symptoms were loss of appetite and gradually progressive paralysis.

MOUSSU (R.) & MARCHAND (L.). **L'encéphalite enzootique du cheval.** [Enzootic Encephalitis in the Horse.]—*Rec. Méd. Vét.* 1924. Feb. Vol. 100. No. 3. pp. 65–90.

In this paper the authors complete their account of enzootic encephalitis in the horse. Their previous communication was abstracted in this *Bulletin* (1924. May 31. Vol. 12. No. 2. pp. 67–70).

A number of different organisms have been encountered in the examination of brains from infected horses, but these have almost invariably failed to infect rabbits. Attention was naturally directed to the possibility that the virus might be filterable, but experiments to test this view have yielded only negative results as regards the virus of naturally infected animals. They have, however, obtained positive results after passing the virus through rabbits. They therefore conclude that it must be classed as filterable. The bacteria that have been found by various authors must be considered as accidental invaders of the nervous system, probably during the period shortly before death. Heating to 60–70°C. has been found to exercise a destructive effect upon the virus. Contact with 10 per cent. uroformine at room temperature for 12 hours failed to modify the activity of the virus. Glycerine does not destroy the virus in three weeks, but two further weeks caused its destruction. The authors have not succeeded in transmitting the disease by ingestion, the path by which the virus appears to infect in natural conditions. Foals do not contract the disease while sucking infected dams, and the authors note that in the outbreaks which they had under observation the foals on the premises all escaped infection.

Inoculation of rabbits with saliva indicated that the virus is not excreted by that path.

Little information is available regarding immunity, but it would appear that an attack does not confer protection.

FROSCH (P.). **Die Morphologie des Lungenseucheerregers. (Eine microphotographische Studie.)** [The Morphology of the Causal Organism of Bovine Pleuro-Pneumonia.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1922. Dec. 30. Vol. 49. No. 1/3. pp. 35–48. With 10 figs.

The author points out the difficulties which have been encountered in attempts to render visible the viruses which are responsible for the diseases due to filter passers. The introduction of an apparatus for photography by ultraviolet light marked a great step forward. The light used has a wave length of ·275 to ·280μ and thus the resolving powers of the lenses are considerably increased. Such rays are not visible to the human eye but they are capable of acting upon photographic plates. Owing to the greater resolving power of the lenses immense numbers of objects not previously visible come into view (in photographs) when ultraviolet light is used. Extreme care must be exercised in the cleansing of all apparatus used and the author states that quartz slides and coverslips must be used. Needless to say, controls of all kinds must be made, and, what is perhaps more important, that experience with the apparatus is essential for the interpretation of results. The original experiments were made with broth cultures of the organism, but this was subsequently given up, and cultures on solid media were used. The author recounts the difficulties he experienced in obtaining sharply focussed pictures. Although colonies can readily be stained it was found that the individual organisms were so faintly stained as to be invisible. In dried preparations staining was more intense, but this led to deformation of the elements.

With ultraviolet light the author succeeded in obtaining photographs of the individual elements forming the colonies by concentrating his attention on their margins. By this means he found that they were oval or polygonal in shape and measured from 0·2 to 0·8μ in diameter.

For the moment the author leaves the nature of the bodies undetermined.

DAHMEN (Hans). **Beitrag zum Studium der Lungenseuche des Rindviehs.** [Studies in Connexion with Bovine Pleuro-Pneumonia.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1922. Dec. 30. Vol. 49. No. 1/3. pp. 49–64.

Cultivation of the causal organism can be achieved without difficulty by adopting the following procedure. Martin's broth is made with a reaction of pH 8. To this is added 1·5 per cent. agar and the medium is sterilized at 115°C. The tubes are allowed to set in a slanting position. The water of condensation is withdrawn by a pipette and replaced by 0·5 cc. of horse serum. The tubes are incubated for 2 days in such a position that the serum spreads over the surface and dries. Colonies become just visible to the naked eye in about 5 days. When magnified the colonies shew an umbilicate appearance. The central part of the colonies grows down into the substance of the medium. With subcultivation colonies develop more rapidly and they may be visible in 2 to 3 days. The author has found that the cultures retain their viability for periods up to 2 months.

In the earliest experiments colonies were found only on the upper one-third of the surface of the medium. The degree of dryness of the agar appeared to be a determining factor in causing this, but subsequent experiments indicated that the distribution of the growth was

due to the actual formation of a dried layer of serum on the upper third of the surface, the serum elsewhere having actually soaked into the medium. In other words, it is the serum itself that is the main factor in obtaining growth. This was shewn in subsequent experiments with Martin's broth, beef broth (Rindfleischwasser), distilled water, and physiological salt solution, all of which were first brought to a reaction of pH 8 and then rendered solid with 3 per cent. agar. The tubes were subsequently treated with horse serum as before. Cultures were obtained upon all of them.

A modification was then made by mixing 2 cc. of serum with the various forms of agar described above while they were still molten and allowing the tubes to set. Cultures were again obtained.

By means of these solid media information was obtained regarding the development of growth in liquid media. A loop of definite size was used to plate out on to solid media daily and from the number of colonies obtained an estimate was made of the bacterial content per cc. of the liquid media.

The figures obtained shewed that the maximum growth had occurred by the third day. For a week onwards the bacterial content remained constant, and during the following week it shewed a slight decrease. From this point it again remained practically stationary. Sedimentation in liquid media began about the 5th day, and subcultures from the supernatent liquid and from the sediment shewed that the organism sank in the medium. It was further shewn in a series of experiments that liquid media could be freed from the organism by the use of the centrifuge. Grape sugar, milk sugar, and glycerin were added to the liquid medium with and without 8 per cent. of serum. Grape sugar in the medium containing serum was found to exert a most favourable influence on the growth of the organism. It was also found, however, that there was a marked production of acid in the medium which caused a rapid decrease in the content of living organisms. The pH of the medium on the 6th day was 7 and on the 10th day it was 6·7.

Experiments with diluted lung lymph and with cultures indicated that opalescence is not of necessity an indication of growth, for the liquid obtained by centrifuging cultures remained turbid, but it yielded no growth on subcultivation.

In obtaining cultures the lymph should be diluted with serum broth and incubated for three days ; this should then be sown out upon solid media.

In the earlier experiments liquid cultures were used as antigen in testing suspected animals, but it became clear that the antigen varied in quality from day to day and was therefore unsuitable for routine tests. This difficulty was overcome by preparing antigen from growths obtained upon solid media.

The author also furnished proof that liquid cultures could be used as antigen provided they were completely sedimented by centrifugalisation and the sediment used. But it was further found that such cultures should not be more than 5 days old, because the acidity which develops not only kills the organism but destroys the antigenic properties of the culture as well. Neutralization does not restore the property.

An alcoholic extract of a 10 day old culture sediment yielded results practically identical with those given by a similar extract of a 3 day old culture.

A further defect attaching to the use of liquid cultures as antigen was the fact that non-specific reactions were likely to be obtained. In one instance serum from an animal in a herd actually free from the disease yielded positive results. Results of this kind have not been obtained with antigen prepared from sedimented organisms.

Evidence is furnished by Dahmen that watery or alcoholic extracts of the organism sedimented from broth cultures can be used with success as antigen. The author's final selection appears to be watery extract of the organism.

A 20 per cent. dilution of this extract was also found to be useful for precipitin tests with suspected sera. It was found in the course of tests of 101 sera, in 8 tests of which complement fixation had given doubtful results, that these results were confirmed either as positive or negative by precipitin tests.

MISCELLANEOUS.

PONS (R.). **Sur l'existence, dans les liquides souillés de sang, de filaments, non organisés, pouvant être confondus avec des spirochètes.** [The Presence, in Liquids Contaminated with Blood, of Unorganized Filaments which may be confounded with Spirochaetes.]—*Bull. Soc. Path. Exot.* 1924. Apr. 9. Vol. 17. No. 4. pp. 307–309. With 1 text fig.

The author describes " filaments " which he has frequently observed when examining liquids contaminated with blood by dark ground illumination. These filaments vary greatly in appearance, but may nevertheless be divided into two groups.

The shorter forms are highly refractile and measure from 8–10μ in length and 0·2–0·3μ in thickness. The ends are slightly swollen and refractile. They are slightly curved and have the appearance of being composed of a number of small elements packed closely one against the other. These filaments never shew evidence of mobility, but they vibrate as though each element were shewing brownian movement.

The long forms are much more slender, and in some cases approach the limit of visibility. They measure 8 to 20μ in length. Like the shorter form, the ends are swollen and refractile. While they do not appear to move from place to place they shew slight undulating movements and also the vibratory movement shewn by the short forms.

These filaments can be made out with far less distinctness in smears stained with Giemsa or with silver than by dark ground illumination. It appears to be difficult to see how these structures should be confused with spirochaetes.

The filaments have been found in the blood of healthy individuals, and of persons suffering from influenza, biliary fever, and fever following rat bite. They have been found in the urine on the third day of a case of biliary fever associated with haemoglobinuria, in the blood of several guinea pigs, rabbits, and monkeys, and in haemo-cultures. No success has ever been achieved in attempts to cultivate the bodies, nor to transmit them by inoculation. The filaments have never been detected apart from blood elements. In two cases in which they were

particularly numerous there have been observed under the ultra-microscope slender filaments projecting radially round red corpuscles which are undergoing degeneration. These " pseudo-spirochaetes " resemble in many details the " pseudo-spirochaetes " described by THOMSON.

CHASSIGNEUX (André). **A propos de quelques symptômes rabiformes observés chez des chiens à Dakar.** [The Rabiform Symptoms observed in Dogs in Dakar.]—*Bull. Soc. Path. Exot.* 1924. Apr. 9. Vol. 17. No. 4. pp. 325–326.

In the author's opinion the cases occurring in Dakar in which symptoms suggestive of rabies have been observed are in reality cases of distemper.

Outlines are given of three cases.

Case 1. In May 1923 a dog shewed evidence of conjunctivitis, coryza and spasms of the pharynx. The following November the animal was said by its owner to have lost its appetite, and to be unable to swallow, save small quantities of water. Examination shewed that there was extreme weakness, ptyalism, paresis of the hind quarters. The dog barked without cause, uttering 7 or 8 short raucous cries. At the postmortem cerebral meningitis was found. This was in the author's opinion a complication of the distemper.

In the second case the symptoms were similar, and there was some dropping of the lower jaw. Paresis became more pronounced and terminated in paralysis. A diagnosis of distemper was made, and this was confirmed by the subsequent course of the disease, which terminated fatally. Distemper is of common occurrence in Dakar. During the cold weather pulmonary and cardiac forms of the disease predominate, and nervous symptoms only appear towards the end. During the hot weather the nervous form is most frequently seen.

Differential diagnosis between the disease and rabies is practically impossible if the dog is not one that is well known. Since the histology of the lesions of the nervous form of distemper resemble or are identical with those of rabies microscopic examination does not enable differentiation to be established. The inoculation of rabbits with brain substance from the cases of distemper may cause paralysis in rabbits, but this is not transmissible in series. But in view of the uncertainties of carrying on the virus rabies by inoculation in series in Senegal this point is deprived of some of its value. It cannot fail to be observed, however, that in spite of the occurrence of many cases of this so-called rabies in dogs cases of rabies do not occur among the human beings. This has led to the belief that there occurs in French West Africa a form of rabies that is not transmissible to man.

GRIFFITHS (J. A.). **Grass Sickness of Cattle : A Seasonal Gastro-Enteritis of Cattle in the Shire Highlands of Nyasaland.**—*Jl. Comp. Path. & Therap.* 1924. June. Vol. 37. No. 2. pp. 114–117.

This condition has been recognised as causing losses in cattle in Nyasaland and in the Highlands in the southern part of Tanganyika for the last 10 years. The disease makes its appearance with the onset of the rains and death is in some cases a matter of only a few hours.

The usual symptoms are cessation of rumination, lagging behind the herd, marked constipation followed by diarrhoea, weakness of the hind limbs, followed by complete prostration. There may be a mucoid discharge from the nostrils and in some cases an eruption of tiny nodules is observed all over the body. Temperature is high at the outset, but soon falls.

At the post mortem there are usually found lesions of bacillary necrosis of the liver. The spleen is normal. The abomasum and small intestine are inflamed as a rule and this inflamation may in some cases be recognised throughout the intestine. The degree of inflammation ranges from a haemorrhagic congestion to actual shedding of the epithelium. Not infrequently a considerable quantity of soil is found in the abomasum. The lungs shew no typical pathological lesion. No causal parasite of any kind has been identified. Blood inoculations and drenching with faecal matter have failed to set up the disease. Repeated chemical analyses have failed to reveal any inorganic poison. The circumstances of the outbreaks appear to suggest that over indulgence in fresh green grass after a period of feeding on harsh dry foods is the primary cause of the condition.

Purgatives are specially to be avoided in treating the disease. Small repeated doses of sodium chloride combined with rectal injections of normal saline have given some measure of success, but a drench containing half a drachm of potassium permanganate, half an ounce of sodium chloride in 1½ pints of water repeated every 2 to 4 hours, combined with large doses of normal saline per rectum, has given the best results.

PÉCAUD (G.). **Contribution à l'étude de la pathologie vétérinaire de la Colonie du Tchad.** [Veterinary Pathology in the Chad Colony.]—*Bull. Soc. Path. Exot.* 1924. Mar. 12. Vol. 17. No. 3. pp. 196–207.

The object of this paper is to emphasize the difficulties experienced in combating the enzootic and epizootic diseases occurring in the colony. The colony contains about a million head of cattle, two million sheep, over forty thousand equines, and a similar number of donkeys, and some seventeen thousand camels. The area is about 600,000 square kilometres. Cattle plague is the most serious disease encountered. It was unknown between 1893 and 1913 when it broke out again, the contagion spreading apparently from the Sudan. It appeared again in 1917 and since then seems to have established itself more or less permanently. There is evidence to shew that the first outbreak was complicated by coccidiosis. As a result of the outbreak of 1913 a considerable number of animals acquired immunity and this was responsible for a reduced percentage of infection and mortality when the disease broke out in 1917.

Bovine pleuro-pneumonia occurs throughout the colony and it has been known to exist at least since 1870 when it was reported by NACHTIGAL. Particularly severe outbreaks are encountered after a severe winter. At the commencement of such an outbreak the mortality may be as high as 70 per cent. but as it progresses the losses become less severe and a large number of animals make spontaneous recoveries. Observations indicated that an immunity lasting for more than 4 or 5

years may be acquired. Protective inoculation is being resorted to with increasing frequency, but it is carried out in a very rough and ready manner by owners with the result that the mortality usually approximates to 15 per cent. There is opposition to inoculation into the tail because loss of the tail leaves an animal more exposed to the torments of flies with resulting loss of condition.

Native vaccinators of the Veterinary Service have obtained good results by subcutaneous inoculation with lung lymph, either fresh or glycerinized, under the skin of the nose. The mortality following this procedure is below 10 per cent.

Inoculation of animals in infected herds only is advised, as deaths following inoculation of animals in uninfected districts as a part of a general campaign against the disease would create a volume of opinion opposed to the procedure.

Tsetse flies are found permanently established along the southern border of the colony and along the Rivers Chari and Logone. A few years ago flies were found still further north than the 12th parallel (approximately the present limit), but the ravages of rinderpest and other factors have tended to cause them to disappear from these areas.

The typanosomiases occurring are :

(1) An infection caused by a parasite of the congolense-dimorphon type. This is usually chronic and runs a benign course. It is readily amenable to treatment.

(2) Souma, caused by *T. cazalboui*. This is a more serious disease. The disease is found in 40 to 50 per cent. of cattle in some areas during the rains.

(3) Baleri, caused by *T. pecaudi*. This occurs as an acute or peracute disease of equines and dogs. Recovery is exceptional.

Piroplasmoses.—Information at present available is contradictory regarding the actual cause of a form of redwater occurring among the cattle and causing a mortality of 50 per cent.

Only one clear case of infection with *Nuttallia equi* has been encountered in the course of ten years. Foot and mouth disease occurs but in a benign form, causing death among calves only. The natives practise aphthization of their own accord.

Other diseases encountered are :—Camel mange, osteomalacia in horses, a microfilaria in the blood of equines, epizootic lymphangitis, and rabies. Black quarter is fortunately of rare occurrence.

JOCOTOT (H.). **L'ecthyma contagieux des lèvres chez la chèvre en Annam.** [Contagious Ecthyma of the Lips of the Goat in Annam.] —*Rec. Méd. Vét.* 1924. May 15. Vol. 100. No. 9. pp. 270–277. With 1 text fig.

The author has observed cases of ecthyma or chancre of the lips of goats on a number of occasions. In Annam, as in France, the disease does not have a definitely seasonal distribution, but in the majority of cases it is encountered between the months of October and January.

Age does not influence susceptibility to the disease, but its course is more serious in young animals. The native races of goats appear to be especially susceptible, and in a small number of cases imported animals appear to have possessed a considerable degree of immunity.

The lesions have a remarkable tendency to spread beyond the lips.

The susceptibility of the sheep has not yet been studied closely ; but it would appear that the sheep is more resistant than the goat.

Recovery leaves a durable immunity. The symptoms are infiltration of the lips followed by an eruption which subsequently spreads to the chin and nose. The lesions become pustular and covered with large thick brownish crusts. When these are removed a small quantity of pus is found beneath. The submaxillary glands are severely inflamed. The exposed pupillae which are enlarged become dry, and thus produce a velvety-like appearance.

Subsequently it develops into a papillomatous outgrowth which dries up and is shed. There is no actual scar left, but the portions of the lips involved become depigmented. As in France, lesions sometimes invade the interior of the mouth.

In a few cases lesions have been seen in unusual places, such as the eyelids, the margin of the anus, vulva, mammary gland, etc.

In adult animals the disease produces no systemic effects, unless mechanically, through rendering prehension of food, etc., difficult, and complications are not to be feared in well-nourished animals.

The disease runs its complete course in 4 to 6 weeks.

Injuries to the lips as a result of rough food appear to be a predisposing cause of the condition. Observations appear to indicate that the disease can be transmitted from animal to animal simply as a result of close contact.

ZELLER (H.). **Klinische, pathologisch-anatomische, histologische, und serologische Befunde bei 50 chronischen Fällen von ansteckender Blutarmut des Pferdes.** [Clinical, Pathological, Histological, and Serological Investigations in 50 Cases of Chronic Infectious Anaemia in the Horse.]—*Zeitschr. f. Infektionskrankh. parasit. Krankh. u. Hyg. d. Haust.* 1924. March. Vol. 26. (No. not stated.) pp. 67–86.

Generally the clinical symptoms and the course of the disease in chronic infectious anaemia in equines are not sufficiently characteristic to permit a diagnosis to be made. The symptoms are only valuable for diagnosis when they are observed in horses in infected areas or on premises where the disease is known to exist.

In the author's observations postmortem examination failed to permit a diagnosis being established in 70 per cent. of cases. But when enlargement and paleness of the spleen, with clearly marked follicles, a watery condition of the blood associated with feeble clotting power, and general paleness of the organs are found in an animal which has, during life, presented suspicious symptoms, a definite diagnosis can be made. Microscopic examination has revealed the presence of abnormalities in the liver and spleen in some thirty per cent. of cases only. In the liver cellular nodules which contain large amounts of haemosiderin are found between the columns of liver cells. In the spleen there is a reduction in the amount of iron pigments and eosinophile leucocytes are present in large numbers.

The author has been unable to devise any method of serological testing which is of any value for the diagnosis of the disease.

TROPICAL DISEASES BUREAU.

TROPICAL VETERINARY BULLETIN.

VOL. 12.] November 30, 1924. [No. 4.

DISEASES DUE TO PROTOZOAN PARASITES.

SCHOENING (Harry W.) & FORMAD (Robert J.). **A Study of the Serology, the Cerebrospinal Fluid, and the Pathological Changes in the Spinal Cord in Dourine.**—*Jl. Agric. Research.* 1923. Dec. 8. Vol. 26. No. 10. pp. 497–505.

The animal from which the material for study was obtained was a fifteen-year-old stallion, which had been condemned as dourine-infected on the grounds of a positive conplement-fixation test in 1913. From 1913 to 1919 he showed no evidence of infection and was worked. During 1920 and 1921 the animal did no work, and gradually lost flesh. During the latter year symptoms indicating involvement of the central nervous system were observed. He would turn in a circle in one direction for several minutes, sometimes falling to the ground and after several minutes would rise again apparently normal. The horse died in December, 1921.

Post-mortem findings :—Gelatinous infiltration of the subcutaneous tissue and abdominal muscles. The left testicle was half the normal size, soft and flabby, and firmly adherent to the coverings. The spleen was slightly thickened and showed haemorrhagic infarctions. The dorsal and lumbar portions of the spinal cord showed gelatinous infiltration.

During the animal's life it was tested eleven times by the complement-fixation test, and gave fairly constant rather weakly positive results.

Cerebrospinal fluid obtained after death was subjected to the colloidal gold globulin and complement-fixation tests. A cell count was also carried out. A positive result was obtained with each of the biological tests, and it is interesting to note that the reaction with the complement-fixation test was more pronounced with the cerebrospinal fluid than with the blood serum taken at the same time.

An average of three cell counts showed 180 per c.mm. Since in normal cerebrospinal fluids this count ranges from 0 to 10 the finding is significant.

It is to be noted that the only controls available for these tests were obtained from three calves killed experimentally with blackleg.

Histological examinations of the spinal cord only were undertaken, and the sections were cut from the dorsal and lumbar portions of the cord. The lesions found were mainly in the latter portion, and were

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as follows :—The capillaries of the dura and pia mater were congested. There was an increase in neuroglia cells which was more marked in the lateral and dorsal columns than in the ventral columns.

Slight evidence of commencing degeneration of the myelin in the medullated fibres was obtained with GOLGI'S method. HELLER'S method rendered the changes more apparent, and it was seen to be more pronounced in the dorsal than in the lateral columns.

VELU, BAROTTE, BALOZET, & BIGOT. **Les réactions à la trypanoléine de Van Saceghem dans les trypanosomiases animales au Maroc.** [Trypanolein (Van Saceghem) in Animal Trypanosomiases in Morocco.]—*C. R. Soc. Biol.* 1924. Jan. 18. Vol. 90. No. 1. pp. 12–13.

The authors have tested the diagnostic value of a material prepared exactly according to the method described by VAN SACEGHEM for the production of trypanolein. They have arrived at the opinion that it does not permit of the diagnosis of trypanosomiasis.

SPACKMAN (W. C.). **The Serum-Aldehyde Test applied to Trypanosomiasis : Observations on Camels.**—*Brit. Med. Jl.* 1923. Dec. 29. p. 1257.

The author records the results of the serum aldehyde test carried out with the sera of 6 camels infected with or suspected of Surra. Trypanosomes were found in the blood of four while the blood of the other two was negative. In 5 of the 6 cases the addition of one drop of formalin to 1 cc. of serum caused opalescence and gelatinization. In the remaining case the serum became faintly opalescent and slightly viscous.

The sera of two healthy camels were used as controls. Both of these remained clear and liquid.

V. FENYVESSY (B.) & REINER (L.). **Untersuchungen über den respiratorischen Stoffwechsel der Trypanosomen.** [The Respiratory Metabolism of Trypanosomes.]—*Zeitsch. f. Hyg. u. Infektionskrankh.* 1924. Apr. 7. Vol. 102. No. 1–2. pp. 109–119.

Living trypanosomes are capable of abstracting oxygen not only from whole blood but from plasma that contains no corpuscles and of giving out carbon dioxide. By means of the BARCROFT-HALDANE apparatus the gaseous exchanges can be measured.

For the maintenance of respiration and movement of trypanosomes the blood plasma of the animal from which the trypanosomes are taken can be replaced by serum from other animals and even by broth and simple solutions.

The spontaneous death of trypanosomes in originally suitable media is explained by the appearance of products of metabolism or disintegration. These are apparently necessary in a definite weak concentration. This destructive action can be prevented by blood serum or broth. The action of this is probably not due to the addition of nutritive material, but to a definite antagonistic action upon the injurious substances.

Respiration and movement in trypanosomes run parallel, but there is some respiration even when the parasites are completely at rest.

Haemoglobin is not a necessary carrier of oxygen for trypanosomes.

SCHMIDT (Fritz) & DE OLIVEIRA (Mano). **Mal de Cadeiras und seine Behandlung mit Bayer 205.** [Mal de Caderas and its Treatment with Bayer 205.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1924. Mar. Vol. 28. No. 3. pp. 91–100. With 2 charts.

The authors have carried out experiments with small animals and with equines. The strain used for the guinea-pigs, rabbits, and dogs was originally derived from a mule.

Among the small animals guinea-pigs were the most useful. Inoculation permitted a prompt diagnosis to be made of suspected cases in equines, and the persistence of trypanosomes in the blood renders a supply of infective material certain.

Unsatisfactory results were obtained in some cases with rabbits. In some the inoculations failed, while when infection did occur trypanosomes were often discoverable in the blood only a short time before death. However, rabbits are preferable to guinea-pigs in the respect that they develop clinical evidence of infection, while in guinea-pigs no symptoms save wasting are observed. In rabbits symptoms appear within 15–25 days, and comprise swelling of the lips, eyelids, nose and ears. These are followed by discharge from the eyes and nose, and finally marked wasting sets in. There may be no recognizable lesions in any of the viscera after death.

The authors found dogs to be the most suitable animals for maintaining the strain of trypanosomes, but it was noted that while guinea-pigs were readily infected from equines, primary inoculations into dogs sometimes failed, and dogs were always readily infected from guinea-pigs. In dogs enlargement of the spleen and lymphatic glands are constant, but no evidence of paralysis has ever been observed.

In all, 40 small animals have been treated with Bayer 205, and in no case has a failure been recorded, in spite of the fact that intervention was postponed until the disease was in the last stages.

Their experience was that a single dose effected a cure, save in one case of a rabbit. In this particular instance the animal had been infected for some time, and trypanosomes reappeared after a dose of 0·5 g. had been given.

Undesirable results have not been observed in any of the small animals after inoculation, save that in two guinea-pigs inflammation developed at the site of injection, which in one case went on to necrosis. This, however, did not prejudice the result. Trypanosomes invariably disappeared from the blood the day after the drug was given.

Dogs which have been cured have been tested up to 114 days after by re-inoculation, but the result has invariably been negative.

The drug has been used as a prophylactic, and it has not been found possible to infect small animals within a month of the protective injection. [It does not appear to be stated whether this is a maximum or minimum period.]

As a result of these experiments the treatment of experimentally and naturally infected equidae was undertaken.

Full details are given of four natural cases and two experimentally infected ones.

Two animals (a mule and a mare) were given doses of 2 g. and 3 g. respectively a fortnight and six weeks before inoculation with 10 cc. of blood containing large numbers of trypanosomes. Neither became infected.

The disease is not common in Southern Brazil where these observations were made, and in consequence the number of cases available

for treatment was small. The authors found that 7 to 9 grammes of the drug were sufficient to effect a cure.

They found that the dose should be divided into three separate quantities of 2, 2, and 3, or 3, 3, and 3 g., and given at intervals of a week.

The first natural case was in a mule. In this instance a definite diagnosis was not arrived at until after the mule was dead, experimentally infected animals failing to develop infection until the death of the mule had occurred.

The drug was injected in a 10 per cent. solution in physiological salt solution, in some of the cases subcutaneously and in others intravenously. In one case the animal after having improved markedly under treatment lost ground again, and showed evidence of loss of control of the hind legs. This was successfully treated with two doses of strychnine. There was swelling and inflammation of the coronets of both fore feet.

The first animal experimentally infected was a mule. Trypanosomes were discoverable in its blood on the fourth day after inoculation. Trypanosomes disappeared from the blood on the day after the first dose of 3 g. of Bayer 205 had been given intravenously, and did not reappear. A second dose was given a week later.

Subsequently the mule was twice inoculated with blood containing large numbers of trypanosomes. The doses given were 5 to 10 cc. The mule resisted re-infection. A mule and a mare which had been given 2 and 3 cc. of Bayer 205 by intravenous injection resisted infection with virulent blood injected after intervals of 2 and 6 weeks.

TEJERA (Enrique). **Investigaciones hechas con el "205" en el tratamiento de la tripanosomiasis que ocasiona le "derrengadera" de los equinos de Venezuela.** [Investigations in the Treatment of Horses affected with Trypanosomiasis in Venezuela by Bayer 205.] —*Gac. Méd. de Caracas.* 1924. June 30. Vol. 31. No. 12. pp. 177–180. (Discussion pp. 180–183.)

Trypanosoma venezuelense kills hundreds of horses in Venezuela every year. Large outbreaks occur throughout October and November and a few cases are seen in March; this is the period of the rainy season. After a series of experiments on smaller animals—rats, guinea-pigs, goats—as to the curative effects of Bayer 205 the drug was tried on a large number of infected horses with good results, provided the dose injected was sufficiently large. Smaller doses led to a marked improvement of symptoms, but the trypanosomes could still be found in the blood. A single injection, even of 4 gm., does not suffice, but 3 gm. at an interval of 10 days proves effectual. For prophylaxis 2 gm. should be injected every six months.*

VOEGTLIN (C.), DYER (H. A.), & MILLER (D. W.). [**On Drug Resistance of Trypanosomes with Particular Reference to Arsenic.**]—*Jl. Pharmacol. & Exper. Therap.* 1924. Vol. 23. No. 1. pp. 55–85. With 2 figs. [Summarized in *Experiment Station Record.* 1924. Aug. Vol. 51. No. 2. p. 181.]

Resistance to drugs on the part of trypanosomes is special adaptation of protoplasm to injurious environment. The resistance to arsenic

* Summarized by Dr. H. Harold Scott.

can be increased by previously injecting the animals treated with Arsphenamin. The change is a more or less specific change in the protoplasm of the parasite. The resistance can be reduced temporarily by passing the strain through another mammalian host. Experiments indicate that virulence has no relationship to arsenic resistance.

The detoxicating effect of certain sulphydril compounds on the arsenoxid action can be demonstrated upon strains with a high arsenic resistance as well as on normal strains.

SHORTT (H. E.) & SWAMINATH (C. S.). **Note on the Infection of a Mouse by means of Bed-Bugs, *Cimex hemiptera* Fabr., fed on the Peripheral Blood of a Case of Kala-Azar.**— *Indian Jl. Med. Res.* 1924. Jan. Vol. 11. No. 3. pp. 965–966.

Bed-bugs were fed upon cases of kala azar showing parasites in the peripheral blood. The bugs were dissected after a lapse of nine days and the dissected guts were emulsified in normal saline and injected intraperitoneally into mice. A minimum period of nine days was allowed to elapse because dissection and microscopic examination have shown that three to six days are required for the flagellation of ingested forms.

Five mice were injected, three field mice and two white mice; four survived. Three of the four were negative and the last positive. In the cases of one of the negative mice and the positive mouse the interval elapsing between inoculation and examination was 123 days. The presence of the parasite in the infected mouse was detected by obtaining cultures from its spleen. The parasite was not found microscopically.

NAPIER (L. E.). **The Reaction of the Blood in Kala-Azar.**— *Indian Jl. Med. Res.* 1924. Jan. Vol. 11. No. 3. pp. 719–732. With 4 graphs.

——. **The Preparation of N.N.N. Media of Different Hydrogen-ion Concentrations.**— *Ibid.* pp. 733–736. With 6 graphs.

These papers do not lend themselves to abstraction as they are full of detailed technique and must be consulted in the original by those interested.

NIESCHULZ (O.). **On a Case of Eimeria Infection in a Cat (*Eimeria felina* n.sp.).**— *Tijdschr. v. Diergeneesk.* 1924. Feb. 15. Vol. 51. No. 4. pp. 129–131.

The parasite was found in the faeces of a cat in Utrecht by the salt concentration method of NÖLLER and OTTEN, but was present in small numbers only. Most of the oocysts had already sporulated when they came under examination.

The oocysts (10) measured 21 μ–26 μ in length, 13 μ to 17 μ in breadth, and had a form index of 0·5 to 0·73. The double contoured envelope was in some cases flattened at one pole, but no definite micropyle could be seen. The cyst wall is described as having externally a thin refractile zone and a thin additional contour line internally. In the completely sporulated oocyst the sporocysts were elongated ovals in shape and showed Stieda's corpuscle. A small residual body was always present.*

* Summarized by Dr. W. H. Andrews, M.R.C.V.S.

ADLER (S.). **A Note on** *Plasmodium agamae* **(Wenyon, 1908).**— *Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 131–133. With 1 text fig.

The author describes a pigmented haemocytozoon in *Agama colonorum*, which he believes to be identical with that described by WENYON in the Soudan in 1908.

Asexual forms, trophozoites, and schizonts were numerous, and schizogony occurred in the peripheral blood. The name should therefore be *Plasmodium agamae* and not *Halteridium agamae.*

STEPHENS (J. W. W.) & GORDON (R. M.). **The Crescent and the Red Cell.**— *Ann. Trop. Med. & Parasit.* 1924. Aug. Vol. 18. No. 2. pp. 207–210. With 4 plates.

In their plates the authors figure variations in the relationship and form of the red corpuscles and crescents seen in films made from a case of malaria in the Federated Malay States.

While they feel unable to form a definite opinion upon the point, the authors have a general impression that the crescents are external to the red corpuscles.

GOZZI (C.). **Alcune osservazioni sulla piroplasmosi in Albania nel cavallo, nel bue, nel cane.** [Piroplasmosis of the Horse, Ox and Dog in Albania.]—*La Clin. Vet.* 1924. July 23. Vol. 47. No. 7. pp. 381–387. With 1 coloured plate.

The author figures and describes organisms found in smears of blood and from the internal organs of horses, cattle and dogs in Albania. Rounded and ring forms predominated, and multiple invasion of corpuscles was observed. Forms bearing some resemblance to " blue bodies " were found, but these the author finds it difficult to interpret.

No experiments were carried out.

DONATIEN (A.), LESTOQUARD (F.), & SAUSSEAU (L.). **Piroplasmes trouvés dans un cas de jaunisse des muletons du Poitou.** [Piroplasms found in the Blood of a Young Mule affected with Jaundice in Poitou.]—*C. R. Soc. Biol.* 1924. May 23. Vol. 90. No. 17. pp. 1308–1310. With 1 text fig.

Jaundice is the cause of serious losses among mule foals in Poitou, and as the symptoms presented resemble those of piroplasmosis the authors examined the blood and found 5 per cent. of the corpuscles containing parasites. The forms found included anaplasma-like forms, pear, ring, and cross forms. The parasite very closely resembled *Nuttallia equi.*

The suggestion is put forward that the infection is transmitted during gestation. MESNIL, in a note, draws attention to the fact that *Nuttallia equi* and *Piroplasma caballi* have now both been detected in France.

LEVADITI (C.), NICOLAU (S.), & SCHOEN (R.). **La microsporidiose du lapin ; ses relations avec la rage.** [Microsporidiosis of the Rabbit. Its Connexion with Rabies.]—*C. R. Acad. Sci.* 1924. Jan. 7. Vol. 178. No. 2. pp. 256–258.

The authors have already published an account of *Encephalitozoon cuniculi*—the cause of enzootic encephalitis in the rabbit—and they

have drawn attention to the resemblance between it and the microsporidial parasites of insects, fish, reptiles, etc. It is the first microsporidium to be observed in a mammal.

They have been able to discover spores in the urine of infected animals and to trace the development of the cysts in the straight tubes of the kidneys. The escape of the spores *via* the urinary system suggests that the method of infection is *via* the alimentary canal through urine-soiled food.

An emulsion of brain substance containing a small number of spores was injected intraperitoneally into several mice. One of these died 18 hours after inoculation. In the peritoneal exudate a large number of spores were found within intracellular cysts. The parasite was also present in the liver.

In view of these findings and in view of the resemblance between encephalitis of the rabbit and rabies the authors think that rabies may possibly be due to a microsporidium. In support of this view they point out that certain microsporidia develop in the nervous system. Further, the virus of rabies develops in the salivary glands and is present in the saliva, while the encephalitozoon is excreted in the urine. Negri bodies have the appearance and staining affinities of microsporidian cysts, and they possibly represent pansporoblasts.

Experiments are in hand with a view to verifying this hypothesis.

LEVADITI (C.), NICOLAU (S.) & SCHOEN (R.). **Nouvelles recherches sur l'*Encephalitozoon cuniculi*.** [New Researches on the *Encephalitozoon cuniculi*.]—*C. R. Soc. Biol.* 1924. Mar. 21. Vol. 90. No. 10. pp. 662–666. With 3 text figs.

Encephalitozoon cuniculi is the microsporidial parasite of enzootic encephalitis of the rabbit.

The mature spores cannot be stained by Laveran or Giemsa after alcohol fixation owing apparently to the presence of a resistant envelope. Young forms acquire a deep purple tint by these methods. Fixation of smears with Bouin-Brasil renders the envelopes more permeable and permits the staining of the spores by safranine-eosin-polychrome methylene blue of Unna and by Mann's method. By the latter method the spores are bright red in colour. Methods used for the staining of bacterial spores are useless. The authors have achieved staining by using the methods described by GUYÉNOT and NAVILLE, that is to say, by treating the smears before fixation with normal soda, hydrochloric acid and sulphuric acid in 5 per 1,000 strength for 2 to 4 minutes.

Smears treated with hydrochloric acid, then stained with iron haematoxylin, show in the spores one or two chromatin granules. A figure shows the varying appearance of the spores.

The phases of development of the parasite have been studied with material from the peritoneal cavity of the rat and from the brain of the mouse. In the former mononuclear cells containing masses of spores and endothelial cells containing pansporoblasts have been observed. Rabbits can be infected by intravenous inoculation. Dogs appear to be susceptible. Rats can be infected by intraperitoneal inoculation.

In mice cysts are found in the brain and also perivascular infiltrations. Microsporidial cysts have been found in the brains of mice which have

not been inoculated. The mouse is therefore apparently affected naturally with a similar parasite.

An attempt to infect a macacus monkey by intra-cerebral inoculation apparently failed.

LIGNIÈRES (J.). **Estudio y Profilaria de las Piroplasmosis, Babesiellosis y Anaplasmosis Bovina en la República Argentina.** [Protective Measures against Bovine Piroplasmosis, Babesiellosis, and Anaplasmosis in the Argentine.]— *Revista Zootécnica.* 1924. May 15. Vol. 11. No. 128. pp. 129–146.

DISEASES DUE TO METAZOAN PARASITES.

ORTLEPP (R. J.). **On a Collection of Helminths from Dutch Guiana.**— *Jl. Helminthology.* 1924. Feb. Vol. 2. No. 1. pp. 15–40. With 14 text-figs.

This paper contains an account of 38 species of helminths from vertebrate hosts.

From the veterinary point of view interest attaches to one of these, viz., *Dirofilaria immitis*, in that a single specimen (broken) was obtained from the heart of a domestic cat.

The new species represented in the collection were *Protospirura bonnei* from the stomach of a rat, *Protospirura guianensis* from the oesophagus of a monki-monki, and *Setaria nudicauda* from an undetermined species of deer.

MHASKAR (K. S.). **A Note on the Reliability of Post-Treatment Diagnoses of Helminth Infections.**— *Indian Jl. Med. Research.* 1924. Jan. Vol. 11. No. 3. pp. 743–747.

This paper is intended to show the period that must be allowed to elapse if a reliable diagnosis of helminth infections is to be made after treatment. The greater part of the paper is occupied by tabular statements regarding the results obtained.

The observations were made upon convicts, who were treated with betanaphthol, thymol, carbon tetrachloride and oil of chenopodium. The first two were given in single doses of 50 grains, carbon tetrachloride in a single dose of 5 cc. and oil of chenopodium in 3 cc. dosage, divided into two parts and given at an hour's interval. The stools were examined by the author's floatation method twice daily for 15 days. Santonin was also used in single doses of 5 grains for the treatment of convicts heavily infected with round worms.

The conclusions drawn were as follows :—

Betanaphthol, thymol, carbon tetrachloride and santonin have a fleeting toxic effect, lasting for three days, on the ovulation of hookworms and round worms. Oil of chenopodium is more toxic for these worms, and its effects are evident up to the twelfth day of treatment.

None of these drugs, in the dosages given, are toxic for whipworms.

The diagnosis of hookworm, round worm, and whipworm infections can reliably be carried on after the fourth day in the case of beta-

naphthol, thymol, carbon tetrachloride, and santonin treatments. With oil of chenopodium, the diagnosis, to be reliable, should not be undertaken until the twelfth day after treatment.

BHALERAO (G. D.). **A Contribution to the Knowledge of the Trematode Parasites of the Food Mammals of Rangoon.**—*Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 139–156. With 3 plates.

This paper is the outcome of examination of trematodes in bullocks, cows, buffaloes, goats, sheep and pigs slaughtered at Rangoon.

The parasites found include :—

Fasciola gigantica, Cobbold ...	bullocks, cows, buffaloes
Paramphistomum cervi, Zeder	liver *Bos indicus*
Eurytrema dajii, n. sp., ...	liver *Bos indicus*
Fasciolopsis fülleborni, Rodenwaldt	intestine pig
Testifrondosa cristata, n. sp.	intestine pig

Testifrondosa n.g. Diagnosis of the genus. Psilostominae. Body covered with scales. Oral sucker smaller than the ventral, latter drawn out posteriorly into a sac-like prolongation. Prepharynx small, pharynx small and globular, oesophagus short. Intestinal caeca nearly reaching the posterior end of the body, genital pore near the intestinal fork. Cirrus sac much elongated, extending beyond the ventral sucker and containing vesicula seminalis. Pars prostatica and Laurer's canal present. Testes branched, in posterior half of the body, one behind the other. Shell gland central, ovary anterior to testes. Receptaculum seminis present. Vitellaria lateral, meeting in middle line posterior to testes. Uterine coils between the shell gland and the cirrus sac. Excretory canal pear-shaped. Eggs large, operculated.

Host *Sus cristatus* (Wagner, 1909).

Type species :—*Testifrondosa cristata*, n. sp. The mature parasites measure from 6 to 8 mm. by 2·5–3·5 mm. The eggs measure 110μ to 130μ by 70μ to 80μ.

Eurytrema dajii. Thirty to forty specimens were found. The parasite measured 5 to 6·7 mm. by 3·5 to 4 mm. They were red in colour and very sluggish. They appeared roundish in their natural habitat, but flattened out when placed in warm water. At the posterior extremity there is a tongue-like appendage. The genital pore is nearer the oral than the ventral sucker. The vitelline glands are 10 to 13 groups on each side composed of slender acini. The uterus becomes visible after the shell gland. It first coils posteriorly, then passes anteriorly between the right testes and the ventral sucker to continue, still coiled, on the right side of the latter, where it joins a long thin muscular vagina.

The parasite agrees with *Eurytrema pancreaticum* (Janson) in the above-mentioned characters. It differs, however, from that species in the following points :—The cuticle carries small square scales measuring 20μ to 50μ. These are thinly distributed and are absent from the edges. The ventral sucker is slightly larger than the oral. The cirrus sac is elongated and tapers posteriorly. It extends from a little behind the intestinal fork to a little in front of the ventral sucker. It is inclined slightly to the left of the middle line. Laurer's canal proceeds anteriorly from the ovary towards the ventral sucker a little behind which it terminates.

BLACKLOCK (D. B.) & THOMPSON (M. G.). **Human Schistosomiasis due to *S. haematobium* in Sierra Leone.**—*Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 211–234. With 1 plate and 4 text figs.

The following is the authors' summary :—

"1. During an investigation into the prevalence of Schistosomiasis in certain districts of the Protectorate of Sierra Leone, infection due to *S. haematobium* was the only type of the disease found.

"2. *Physopsis* c.f. *globosa*, Morelet, was proved to be the intermediate host ; the infection rate in the mollusc with cercariae of *S. haematobium* was often very high, *e.g.*, 42 per cent. in a water latrine.

"3. A description is given of the morphology of the cercaria of *S. haematobium* ; it differs markedly from the description of this cercaria at present accepted.

"4. A critical analysis of the basis of the existing description is undertaken.

"5. Some facts relating to the bionomics of *Physopsis* c.f. *globosa* are mentioned ; experiments showed that this snail was resistant to drying to an unexpected degree.

"6. Of snails placed on mud in the shade a large percentage survived for a fortnight when the water was drained away gradually."

VEGLIA (F.). **Preliminary Notes on the Life-History of *Oesophagostomum columbianum*.**—*Union of S. Africa Dept. of Agric. 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 811–823. With 4 Plates. (1924. Pretoria : Govt. Printing & Stationery Office.)

This paper contains observations regarding the life-history of *Oesophagostomum columbianum*, a parasite which next to *Haemonchus contortus* is the most serious cause of parasite disease of sheep in South Africa.

The post-embryonic life of *Oesophagostomum columbianum* is divided by metamorphoses into four larval and an adult stage.

The first two stages are passed in the outside world. During the third stage the parasite is taken in by the sheep, and the final two stages are entirely parasitic. Reference must be made to the original for anatomical details of the larval phases.

The parasitic life is passed wholly in the intestine. Normally the larvae become encysted in the mucous membrane of the large intestine, but they may be found further forward on occasion. In severe infestations the diarrhoea may cause the evacuation of the majority of the larvae.

The minimum periods observed for parasitic development in young lambs may be indicated as follows :—The second ecdysis completed in the first day after infection. On the second day the larvae penetrated the mucosa and encysted. On the fourth day they were in lethargus undergoing the third ecdysis. On the fifth day they were found in the active period of the fourth day and engaged in completing the third ecdysis. On the sixth day larvae began to emerge from the cysts in the mucosa. By the twenty-sixth day a few worms had completed the fourth ecdysis, and by the thirtieth day most of the worms were adults.

The cysts after evacuation usually heal, but the calcareous and caseous nodules sometimes found result from accidental infections with bacteria.

GOODEY (T.). **The Anatomy of** *Oesophagostomum dentatum* **(Rud.) a Nematode Parasite of the Pig, with Observations on the Structure and Biology of the Free-Living Larvae.**—*Jl. Helminthology.* 1924. Feb. Vol. 2. No. 1. pp. 1–14. With 15 text figs.

This paper contains an account of the adult worm, of the first and second stage larvae, and some observations on the biology of the ensheathed larvae.

For details of anatomical structure the original paper should be consulted. The following are the principal points referred to in connection with the biology of the ensheathed larvae.

The ensheathed larvae are positively geotropic, and show no inclination to climb up the sides of the containing vessel. They are capable of resisting desiccation for one or two days. At room temperatures their movements are slow, but when gradually warmed to 37° C. they become very active. They differ from ancylostome larvae in showing no evidence of positive thermotropism. The larvae appear to be incapable of penetrating sound skin.

CAMERON (T. W. M.). **Dochmoides : A New Genus for the Hookworm** " *Uncinaria* " *stenocephala* **Railliet.**—*Jl. Helminthology.* 1924. Feb. Vol. 2. No. 1. pp. 46–50. With 5 text figs.

The importance of this worm in the fox-breeding industry appears to warrant a new description, more particularly as the older descriptions are incomplete.

The material examined was from a British fox which died in captivity. Since the type of the genus *Uncinaria*, viz. *U. vulpis*, cannot be identified from the existing description, it appears to be correct to allow this name to lapse and to propose a new one, and, accordingly, *Dochmoides* is suggested.

The time does not appear to be ripe for the division of the *Ancylostomidae* Looss into sub-families.

CAMERON (T. W. M.). **On** *Gaigeria pachyscelis* **Railliet and Henry, 1910, a Nematode Parasite of Ruminants.**—*Jl. Helminthology.* 1924. Feb. Vol. 2. No. 1. pp. 41–45. With 7 text figs.

This parasite was originally described by RAILLIET and HENRY from material sent by GAIGER from India in 1910. GEDOELST reported its occurrence in the Belgian Congo in 1916.

A new examination of the parasite has been undertaken because the earlier description was incomplete and difficult to obtain.

Previous material was obtained from the sheep, and possibly also from the cow, but there appears to be some doubt about the latter.

The material in the present instance was obtained from a goat in India.

MONNIG (H. O.). **South African Parasitic Nematodes.**—*Union of S. Africa Dept. of Agric. 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 435–478. With 46 figs. (1924. Pretoria: Govt. Printing & Stationery Office.)

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

DE BLIECK & BAUDET. **Tetrachloorkoolstof abs Wormmiddel bij Paarden.** [Carbon Tetrachloride as an Anthelmintic for Horses.] —*Tijdschr. v. Diergeneesk.* 1924. Apr. 1. Vol. 51. No. 7. pp. 257–262.

A not inconsiderable portion of this paper is a survey of previous results obtained by the authors, DEMNITZ, HALL, and others in the treatment of horses with carbon tetrachloride.

From this it may be gathered that there are indications that foals are less susceptible to the toxic action of the drug than adult horses; that there may be a risk attaching to the administration of the drug by means of the stomach tube unless the tube is passed right into the stomach.

Carbon tetrachloride appears to be a suitable drug for the destruction of ascarids and strongylids, while carbon bisulphide is preferable for gastrophiles and chenopodium for cylicostomes.

It is noted that it is not possible to distinguish between infections with strongylids and cylicostomes by examination of the eggs present in the faeces.

The new material incorporated in the present paper refers to the treatment of five horses.

Case 1. A horse weighing approximately 1,000 lb. was given 80 g. of carbon tetrachloride as an emulsion in gum arabic. There was no disturbance of health.

Case 2. A horse of about 900 lb. weight was given 80 cc., not as an emulsion (actual method not stated). No disturbance of health.

Case 3. This animal as a 2-year-old had been given 200 g. of the drug without causing any disturbance. It was treated for a second time as a 3-year-old with 65 g. It had been used in the interval for a number of experiments and was in rather poor condition. Apart from a slight rise of temperature lasting for 4 days no disturbance of health was noted.

Case 4. Eighteen months old animal in rather poor condition. Dose of carbon tetrachloride administered, 35 g. No untoward result.

Case 5. A 2-year-old which had been used for surra experiments, and which was in poor condition, weighing only some 650 lb. The dose used was 65 g. in gum arabic. There was a slight rise of temperature.

The authors find that carbon tetrachloride is an excellent drug for the expulsion of gastrophilus larvae, ascarids, oxyuris, and strongylids. They recommend a dose of 0·1 cc. per kilogram body weight as being safe but efficient.

It is suggested, although the authors have not practised it, that the stomach tube should be passed right into the stomach and that water should be passed through it before it is withdrawn to make sure that none of the drug remains in it. It is not necessary to make an emulsion with gum arabic, but by doing so the risk of irritation of the mucous membrane is reduced.*

* Summarized by Dr. W. H. Andrews, M.R.C.V.S.

CHANDLER (W. L.). [**On the Vermicidal Value of Iodin, with Notes on Two New Iodin Preparations and Suggestions as to their Probable Therapeutic and Disinfectant Values.**]—*Michigan Sta. Quart. Bull.* 1924. Vol. 6. No. 3. pp. 112–119. [Summarized in *Experiment Station Record.* 1924. July. Vol. 51. No. 1. pp. 79–80.]

The author claims to have produced a crystalline form of iodine which differs from sublimed iodine. It is more readily soluble in water, castor oil and other iodine solvents. A saturated aqueous solution contains 0·04 per cent. The exact nature of this preparation of iodine is still problematical. This form of iodine is said to be active against intestinal parasites, but to be valueless against stomach parasites in the sheep.

It is also claimed that a new protein iodine compound has been prepared which liberates free iodine in the stomach of the sheep. It is said to be the most promising form of iodine against the stomach worms of sheep.

ISBECQUE (G.). **Recherche d'anticorps spécifiques chez les porteurs de vers intestinaux.** [The Detection of Specific Antibodies in Carriers of Intestinal Parasites.]—*C. R. Soc. Biol.* 1924. Mar. 21. Vol. 90. No. 10. pp. 691–692.

The author outlines the technique which he has applied and comes to the conclusion that deviation of the complement is constant when the corresponding antibody is present. The reaction is not absolutely specific.

CURSON (H. H.).* **Notes on** *Glossina pallidipes* **in Zululand.**—*Bull. Entom. Research.* 1924. May. Vol. 14. No. 4. pp. 445–453. With 1 map & 3 plates.

The notes published in this paper were collected while the author was carrying on an investigation into nagana. The paper is divided up into short sections dealing briefly with (1) the type of country frequented; (2) fly belts; (3) seasonal and meteorological influences; (4) method of attack; (5) choice of hosts; (6) relation of tsetse to water; (7) influence of colour; (8) glossina repellent; (9) influence of moving objects; (10) human habitations; (11) travelling habits of glossina; (12) circumstances under which cattle are infected by glossina; (13) behaviour of glossina on dead game; (14) effects of European settlement in glossina country; (15) influence of grass fires; (16) possibility that fly area in Southern Portion of Lower Umfolosi Division is extending; and (17) predatory enemies of glossina.

POTTS (W. H.). **A New Variety of** *Glossina schwetzi*, **Newstead & Evans, from the Belgian Congo.**—*Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 205–206. With 1 text fig.

Glossina schwetzi var. *disjuncta* var. nov. Colour and pattern as in typical *G. schwetzi*, but the distal processes of the harpes short and detached, and the median process more prominent.

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* 1923. Vol. 11, No. 1, p. 7, line 19 from bottom. Paper on "Nagana and the Tartar Emetic Treatment." The author's name should read "CURSON (H. H.)," *not* "CARSON (H. H.)."

DELANOË (P.). **Myases du bétail du Cercle des Doukkala causées par les larves d'une mouche sarcophile, *Wohlfartia magnifica* Schiner 1862.** [Myiasis of Cattle caused by the Larvae of *Wohlfartia magnifica*.]—*Bull. Soc. Sci. Nat. Maroc.* 1922. Dec. 30. Vol. 2. Nos. 7 & 8. pp. 132–136. With 2 text figs.

This fly has been recognized as being responsible for myiasis in many species of animals in Russia, France, Germany, Roumania and elsewhere. The author has given attention to the subject for the last three years in Morocco, and has never been able to identify any fly as causing myiasis other than *W. magnifica*. The Camelidae appear to be the worst sufferers. In these animals he has encountered infestations where there was no primary wound. This he has not observed in either cattle or horses. The vulva of the camel is the favourite place for the deposition of the eggs. Since the larva attack undamaged tissues it is not in the least surprising that the slightest wound is likely to become infested by them. The author advises all owners to wash the vulva twice weekly with water containing cresyl, for the reason that it appears to be the odour of this always moist and greasy orifice which attracts the flies. Once infestation has occurred attempts at cure involve extensive surgical interference.

Next to the camel the horse is the principal sufferer, and wounds almost invariably become infested with maggots during the fly season.

The author has collected larvae and has hatched out flies. At ordinary temperatures this requires 16 to 18 days.

The less frequent occurrence of the myiasis in cattle is probably due to the fact that these do not injure themselves so frequently as horses.

PATTON (W. S.). i. **Note on the Occurrence of *Hypoderma lineatum* Villiers, in the Punjab.** ii. **Note on the Second Stage Larva of *Hypoderma crossi* Patton.** iii. ***Gasterophilus crossi* sp. nov., Parasitic in its Larval Stage in the Stomach of the Horse in the Punjab.**—*Indian Jl. Med. Res.* 1924. Jan. Vol. 11. No. 3. pp. 961–963.

i. The author notes the presence of *H. lineatum* among a collection of larvae and adults made by CROSS.

Hypoderma crossi, though most commonly found in the skins of goats, also occurs in the skins of cattle. *H. lineatum* is mainly a parasite of cattle, but also occurs in the skins of goats.

ii. A description is given of what the author considers to be the true second stage of this larvae. He is in disagreement with LAAKE, but he is not satisfied that the evidence brought forward by LAAKE regarding the occurrence of 5 stages in life of the Hypoderma larva is satisfactory. In this GEDOELST agrees with him.

iii. The author describes a new species, *Gasterophilus crossi*, which CROSS bred from larvae collected from the excreta of horses.

The following is a short description :—Average length of two females with ovipositors extended 13 mm. General colour black with white and light yellow hairs. Frons and face light yellow, orbital margins black, ocellar triangle dark brown to black. Antennae, including arista, whitish yellow. Thorax covered dorsally with light yellow hairs throughout, pleural tuft consisting of whitish hairs, scutellum with yellowish white hairs. All femora dark brown, apices and most of the ventral surface light yellow ; fore- and mid-tibiae light brown,

hind-tibiae light yellow; all tarsi light yellow. Abdomen black throughout and sparsely covered with white hairs. Wings hyaline, veins brown, venation similar to that of *Gasterophilus veterinus*.

BLACKLOCK (B.) & THOMPSON (M. G.). **Rat-Fleas in Freetown, Sierra Leone.**— *Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 135–137.

The authors give the identification of over 600 fleas removed from 62 black and 38 brown rats.

Importance attaches to the findings in connection with the transmission of plague.

SHARIF (M.). **The External Morphology and Bionomics of the Commonest Indian Tick** (*Hyalomma aegyptium*).— *Agric. Res. Inst. Pusa, India. Bull. No.* 152. 1924. pp. 1–23. With 5 plates (2 in colour).

For the morphological details of this ectoparasite reference must be made to the original paper.

When placed in suitable surroundings in the laboratory females began to lay eggs from 9–12 days after quitting their host. Oviposition continued for about three weeks during which time 6,000–8,000 eggs were laid.

The period required for hatching varies with the temperature from 3 weeks to 2 months.

In the hot weather the heat of the sun is sufficient to kill larvae exposed to it.

The author has found larvae on the ears of the horse, calf, camel, and buffalo. Larvae require 3 to 5 days for engorgement, and it is stated that the larvae may be red or blue in colour, this variation depending upon whether they have fed upon arterial or venous blood. Moulting requires 5 to 7 days. The nymphs are of a chocolate red colour. Engorgement required 5 to 7 days and the moulting of the nymphs 9 to 15 days.

"Ticks are very rare on the host in the winter season mid-November to mid-February. The adults are very rare on animals, absent in the majority of cases. But it is impossible to find nymphs and larvae on the host."

DU TOIT (P. J.). **Sheep Scab: the Infectivity of Kraals.**— *Union of South Africa. Dept. of Agric. 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 223–229. With 22 figs. (1924. Pretoria: Govt. Printing & Stationery Office.)

Although in an earlier investigation, SHILSTON (1916) and BEDFORD published results indicating that ten days is a sufficient period to free a kraal from sheep scab infection, certain objections of some weight were raised against their experiments. The present experiments were carried out with a view to meeting these objections.

The experiments were divided into two parts. The first was designed to furnish an answer to the question as to whether a period of 17 days was sufficient to free a kraal from infection, and the second to show whether an infected kraal could re-infect scabby sheep immediately after dipping.

Details are given of the manner in which the objections raised to the earlier experimental results were met, in the matter of making the tests as severe as possible, and the result indicated that a period of 17 days was sufficient to render a very heavily infected kraal safe for healthy sheep.

In the second experiment severely infected sheep were dipped twice at an interval of 9 days in a lime and sulphur dip and replaced in the infected kraal immediately after the second dipping. The interval between the dippings was also passed in the infected kraal. None of the sheep showed any sign of re-infection.

AUSTEN (E. E.). **Additional Records of Palestine Tabanidae, with Descriptions of New Species.**—*Bull. Entom. Research.* 1924. May. Vol. 14. No. 4. pp. 421–432. With 4 text figs.

BAYLIS (H. A.) & DAUBNEY (R.). **A further Report on Parasitic Nematodes in the Collection of the Zoological Survey of India.**—*Records of the Indian Museum.* Calcutta. 1923. Dec. Vol. 25. No. 6. pp. 551–578. With 20 text figs.

BLACKLOCK (B.) & THOMPSON (M. G.). **Observations on the Classification of certain Schistosome Cercariae.**—*Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 235–237.

BRUG (S. L.). **Notes on Dutch-East-Indian Mosquitos.**—*Bull. Entom. Research.* 1924. May. Vol. 14. No. 4. pp. 433–442. With 8 text figs.

EDWARDS (F. W.). **A Synopsis of the Adult Mosquitos of the Australasian Region.**—*Bull. Entom. Research.* 1924. May. Vol. 14. No. 4. pp. 351–401.

FULLER (Claude). **Tsetse in the Transvaal and Surrounding Territories: An Historical Review.**—*Union of S. Africa, Dept. of Agric., 9th & 10th Rep. Director Vet. Education & Research. April, 1923.* pp. 317–378. With 1 folding map and 9 plates. (1924. Pretoria: Govt. Printing and Stationery Office.)

MACGREGOR (Malcolm E.). *Aëdes (Stegomyia) mascarensis*, **MacGregor: A New Mosquito from Mauritius.**—*Bull. Entom. Research.* 1924. May. Vol. 14. No. 4. pp. 409–412. With 1 text fig.

MATHIAS (Paul). **Cycle évolulif d'un trématode échinostome (***Hypoderaeum conoideum* **Bloch.).** [The Life History of *Hypoderaeum conoideum*, Bloch.]—*C. R. Soc. Biol.* 1924. Jan. 18. Vol. 90. No. 1. pp. 13–15.

MEGGITT (F. J.). **On the Life History of a Reptilian Tapeworm** (*Sparganum reptans*).—*Ann. Trop. Med. & Parasit.* 1924. Aug. 2. Vol. 18. No. 2. pp. 195–204. With 1 plate.

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

RANSOM (B. H.). **Hookworms of the Genus Uncinaria of the Dog, Fox and Badger.**—*Proceedings of the United States National Museum.* No. 2533. Vol. 65. Art. 20. 5 pp. With 1 plate.

SKRJABIN (K. I.). *Progynopylidium nölleri*, **n.g. n.sp. ein neuer Bandwurm der Katze.** [*Progynopylidium nölleri*, n.g. n.sp., a New Tape Worm of the Cat.]—*Berlin. Tierärzt. Woch.* 1924. Aug. 8. Vol. 40. No. 32. pp. 420–422.

THEILER (Gertrud). **The Strongylids and other Nematodes parasitic in the Intestinal Tract of South African Equines.**—*Union of S. Africa, Dept. of Agric., 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 603–773. With 55 plates. (1924. Pretoria: Govt. Printing and Stationery Office.)

BACTERIAL DISEASES.

EVANS (Alice C.). **The Serological Classification of** *Brucella melitensis* **from Human, Bovine, Caprine, Porcine and Equine Sources.**—*Public Health Reports.* 1923. Aug. 24. Vol. 38. No. 34. pp. 1948–1963. With 1 chart.

The author has carried out simple agglutination tests which confirm the view that by this means *Brucella melitensis* and *Bacillus abortus* are not capable of being separated.

BURNET (Et.) & ANDERSON (Ch.). **Importance de la mammite chez les chèvres porteuses de** *M. melitensis.* [The Importance of Mammitis in Goats that are Carriers of *M. melitensis.*]—*C. R. Acad. Sci.* 1924. Jan. 21. Vol. 178. No. 4. pp. 428–430.

Since the milk of goats that are carriers of *M. melitensis* infection is frequently rich in the organism, while it is rarely found in the blood or the organs, it appears to be probable that the organism maintains itself in the mammary gland.

The authors have had the opportunity of keeping six naturally infected goats under observation for varying periods, and of making post-mortem examinations.

Five of the goats were apparently in perfect health and good milkers, while the other was clinically infected, poor in condition, and yielded milk having a bad appearance.

Details of serum tests, cultivations from the milk, etc., and the post-mortem findings for each of these animals are given.

In five out of the six *M. melitensis* was cultivated from the mammary gland. In the case of the sixth animal the gland was in a condition of complete involution.

The organism was recovered from the mammary and supra-mammary glands in the other animals.

In four of the goats, which were in milk, microscopic examination of the mammary gland revealed the presence of mastitis. In one there was a large multilocular abscess, in the second a circumscribed abscess, and in the remaining two centres showing inflammatory changes.

BURNET (Et.) & DE LAGOANÈRE (J. L.). **Pouvoir pathogène du** *M. melitensis* **et du** *B. abortus* **pour le rat et la souris.** [The Pathogenicity of the *M. melitensis* and *B. abortus* for the Rat and Mouse.]—*Bull. Soc. Path. Exot.* 1924. June 11. Vol. 17. No. 6. pp. 465–467.

In connexion with a search for some animal which would serve as a means of distinguishing *M. melitensis* from *B. abortus* the authors have made bacteriological examinations of 80 grey rats caught in Tunis in a quarter containing some 3,000 goats, of which 5 per cent. were infected with *M. melitensis.* Serum tests do not appear to have been carried out, but the spleen, glands, marrow and liver were used for seed material. In no case was a single colony of *melitensis* found.

Experimentally white rats are as susceptible to *B. abortus* as to *M. melitensis.* They are readily infected by subcutaneous inoculation and by ingestion provided in the latter case a sufficient dose be given. By whatever path the infective material gains access complete recovery follows in a month or two.

Grey and white mice have been infected by subcutaneous inoculation and by ingestion with both organisms. No difference in pathogenicity has been discovered.

Mice are far more susceptible to inoculation than rats, their susceptibility approximating closely to that of the guinea-pig.

They are more resistant to infection by way of the mouth than by subcutaneous inoculation, but they possess a lower degree of resistance than the rat.

Contrary to what is the case in the rat, mice acquire chronic infections and do not recover.

On these grounds the authors suggest that mice may form a reservoir of infection.

Infection does not always lead to the presence of agglutinins in the blood.

QUINLAN (John). **The Susceptibility of Calves to Contagious Abortion when fed on Milk from Infected Cows.**—*Union of S. Africa. Dept. Agric. 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 559–600. (1924. Pretoria: Govt. Printing & Stationery Office.)

The blood serum of calves fed upon milk from naturally infected cows sometimes causes agglutination. The titre is not, as a rule, high. The antibodies present in the serum of calves do not persist, and not infrequently disappear even while the diet of infected milk is continued. They always disappear when it is stopped. It is safe to use infected milk for the feeding of calves up to the age of 6 months or so, and the infected milk is not detrimental to their health.

COTTON (W. E.). **The Present Status of Abortion Disease in Cattle, its Spread, Influence of Male and Control.**—*Vet. Med.* 1924. Aug. Vol. 19. No. 8. pp. 463–469.

As indicated in the title, this paper is a summary of the present position regarding abortion. Reference is made to the natural occurrence of abortion in pigs caused by a similar organism. COTTON and SCHROEDER have tried without success to infect cattle naturally from sows by exposure, nor have they succeeded in infecting sows from cattle by exposure. The organisms isolated from natural infections in the two species differ somewhat in their effects upon guinea-pigs inoculated with them. Experiments are being carried out with a view to determining whether two distinct types of bacillus occur. The occasional occurrence of infection in virgin heifers may be due to the continued feeding with milk from infected cows up to the time of sexual maturity, a practice which is followed in some pure breed herds. Failure to abort in pregnant cows may be evidence of late infection. A positive reaction to the agglutination test is held to indicate existent or past infection; a point which can sometimes be settled by the carrying out of a succession of tests at short intervals.

BEVAN (L. E. W.). **Infectious Abortion. The Use and Abuse of the "De-vitalised" Vaccine.**—*Rhodesia Agric. Jl.* 1924. June. Vol. 21. No. 3. pp. 281–282.

The author briefly explains the nature and uses of "devitalised" vaccine with a view to clearing away misapprehensions regarding these points.

BROCQ-ROUSSEU & URBAIN. **De la réceptivité pulmonaire à l'infection charbonneuse chez le lapin et le cobaye.** [The Susceptibility of the Lungs of the Rabbit and Guinea-Pig to Infection with Anthrax.] —*C. R. Soc. Biol.* 1924. Jan. 18. Vol. 90. No. 1. pp. 4–6.

According to BESREDKA and others, in the rabbit and guinea-pig the skin is the only organ susceptible to infection with anthrax. It is therefore possible, according to this view, to introduce anthrax material into the bodies of these animals without infecting them, provided there is no injury to the skin. In such animals no protection is established. On the other hand, animals can be completely immunized by vaccination of the skin. COMBIESCO holds, however, that the injection of a large dose is sufficient to set up infection, and, further, he has been able to infect by direct inoculation into the lung.

The experiments recorded by Brocq-Rousseu and Urbain aimed at proving whether it was possible to infect *via* the lungs, the skin remaining uncontaminated. Ten guinea-pigs were injected intratracheally with 0·2 cc. of a virulent anthrax culture, suitable precautions being taken to avoid contamination of the skin. Two controls were inoculated intracutaneously and two subcutaneously. All of these died in 2–3 days. Six of those inoculated intratracheally died within 4–5 days of anthrax, the remaining four survived. Two of these were tested a fortnight later with $\frac{1}{8}$ cc. of 2nd anthrax vaccine and died. Five rabbits, with suitable controls, were treated in the same way, the dose being 0·3 cc. Three survived, and when tested three weeks later succumbed to anthrax. The experiment was repeated with guinea-pigs vaccinated by the cutaneous path. Eight vaccinated guinea-pigs were inoculated *via* the trachea and 7 directly into the lung through the chest wall. All survived.

BROCQ-ROUSSEU & URBAIN (Achille). **Sur la cuti-immunité due à la cuti-vaccination anticharbonneuse chez le cobaye.** [Cuti-Immunity against Anthrax in the Guinea-Pig produced by Cuti-Vaccination.]—*C. R. Soc. Biol.* 1924. May 23. Vol. 90. No. 17. pp. 1307–1308.

Three strains of anthrax have been used—(*a*) a strain capable of killing rabbits in a dose of $\frac{1}{10000}$ m.g., (*b*) a "diffuse" strain as described by GRATIA, and an "agglutinated" strain described by the same author.

GRATIA describes the "diffuse" strain as being innocuous to the rabbit by all methods of infection save intradermally, and the "agglutinated" strain as being fatal to the rabbit by all paths. Both of these strains were found to be fatal for the guinea-pig in 3 to 4 days in a dose of $\frac{1}{10000}$ cc. Twenty-four guinea-pigs were used which had previously been subjected to cuti-vaccination. These were inoculated as follows:— Six were inoculated into the kidney with $\frac{1}{30}$ cc. of the virulent culture, and three each were inoculated in the same way with GRATIA'S strains. Two guinea-pigs were inoculated into the thickness of the wall of the large intestine with $\frac{1}{30}$ cc. or $\frac{1}{20}$ cc. of the three cultures. Three were inoculated intraperitoneally and three into the liver with $\frac{1}{30}$ cc. of the virulent culture.

All the animals resisted infection. Twelve controls were inoculated either subcutaneously or intracutaneously with the same three strains and all succumbed.

BOQUET (A.). **Sur l'infection charbonneuse du cobaye par inoculation sous-muqueuse de bactéridies.** [Infection of Guinea-Pigs with Anthrax by Submucous Inoculation.]—*C. R. Soc. Biol.* 1924. Jan. 25. Vol. 90. No. 2. pp. 72–73.

When guinea-pigs are fed with large doses of anthrax spores (*e.g.*, 20 to 50 cg. of 2nd vaccine agar culture) some die in from 4 to 9 days with swelling of the throat. This lesion, which is usual in naturally infected pigs, suggests that the organisms gain access by direct passage through the mucous membrane of the mouth or pharynx.

Experiments designed to show whether this is the case are outlined by the author. Inoculation under the mucous membrane of the tongue or into the muscular tissue of that organ with $\frac{1}{500}$ cc. of second vaccine causes death in 2 to 5 days, like the controls inoculated subcutaneously, and they show cervical oedema which is proportional to the period of survival after inoculation. The tongue is also swollen and there is a small necrotic patch at the seat of inoculation. Exactly parallel results follow inoculation into the mucous membrane of the cheek and the conjunctiva.

GRATIA (André). **Infection charbonneuse et immunité anticharbonneuse obtenues par la voie sanguine.** [Infection and Immunity in Anthrax produced Intravenously.]—*C. R. Soc. Biol.* 1924. June 20. Vol. 91. No. 21. pp. 113–115.

The author is of the opinion that BESREDKA's theory regarding the susceptibility of the skin and its capacity for producing immunity against anthrax is not justified by the facts. The skin, he points out, is less protected against anthrax infection than the blood. He has shown that the simple injection of broth into the skin reduces its susceptibility to anthrax by the leucocytosis which it provokes.

The author possesses a strain of anthrax which comprises two varieties. One of these, which yields a turbid broth culture, can be injected with impunity into the circulation of rabbits; the other, which gives an "agglutinated" broth culture, is fatal to rabbits by intravenous injections in doses of 1 cc. in 4 to 5 days. If, instead of using culture, blood is taken from a rabbit on the point of death and one injects ·25 to ·5 cc., repeating this in series, at the third passage death may take place as early as the 15th hour. The diffuse type of culture can be injected intravenously, and by repetition of the dose at intervals of 8 days a high degree of immunity can be established, even against the virulent strain.

BOQUET (A.). **Rôle des traumatismes dans l'infection charbonneuse du cobaye par les voies digestives.** [The Part played by Injuries in the Infection of Guinea-Pigs with Anthrax by the Alimentary Canal.]—*C. R. Acad. Sci.* 1924. Jan. 7. Vol. 178. No. 2. pp. 260–262.

PASTEUR, CHAMBERLAND, and ROUX have recorded their observations that laboratory animals, which are so susceptible to other methods of infection, offer an almost complete resistance to infection with anthrax by way of the alimentary tract.

On the other hand, BESREDKA'S experiments seem to indicate that in the guinea-pig it is the skin alone that is susceptible to anthrax infection.

It is, however, the general view that natural infection is commonly by ingestion. The author attempts to find some explanation of this apparently flagrant contradiction.

If guinea-pigs are fed with large doses of anthrax spores after 36 hours' starvation, their heart blood will yield positive cultures in 10 to 18 hours after the infecting feed. This occurred in the author's experiments in 6 out of 10 guinea-pigs. The blood was obtained by heart puncture. After this cultures remain sterile.

As only about one guinea-pig in six infected died of anthrax it appears to be probable that many of the animals resist infection contracted by way of the alimentary tract, and behave in the same way as those inoculated intravenously by BESREDKA. Guinea-pigs which have survived the ingestion of massive doses of first and second vaccine administered at an interval of 8 to 10 days succumb to a subcutaneous injection of $\frac{1}{10}$ cc. of second vaccine administered three weeks later.

A further point brought out by the experiments is that all the guinea-pigs, save about one in twenty, which have been bled by heart puncture, 2 to 20 hours after the infecting meal, have died of anthrax with oedema around the seat of the puncture made by the needle. On the other hand, of the animals infected in the same way and not bled, only one in six has died.

Twenty-one fresh guinea-pigs were starved and then fed with large doses of second vaccine. These were divided into five batches and were bled 3, 4, 5, and 20 hours later. Cultures of heart blood were negative in the cases of the animals bled at 3 hours and 20 hours' interval, but positive in the other two batches. The whole of the animals died of anthrax.

Six guinea-pigs (apparently surviving from the last experiment but one described.—Ed.) were shaved, scarified or bruised, and two which were given subcutaneous injections of 2 cc. of Locke's Solution died of anthrax on the fourth to sixth day.

Of nine guinea-pigs of the same batch which were not scarified only one died of anthrax. Seven fresh guinea-pigs which were shaved and scarified were placed in contact as controls to contamination from the exterior. None contracted anthrax.

MAZZETTI (Giuseppe). **Della sorte dei bacilli del carbonchio nel corpo delle cavie morte per infezione carbonchiosa e conservate alla temperatura del ghiaccio fondente.** [The Fate of Anthrax Bacilli in the Bodies of Guinea-Pigs dead of Anthrax kept at 0° C.] —*Pathologica.* 1924. Sept. 1. Vol. 16. No. 379. pp. 452–454.

Anthrax bacilli in guinea-pigs kept at 0°C. after death gradually decrease in number as the interval elapsing between death and post-mortem examination is increased. The organism persists in the blood for longer periods than in the organs. Cultures made from the organs were sterile by the 30th day, but cultures, though scanty, were obtained from the blood on the 41st day.

In a second series of experiments cultures could not be obtained from the spleen after the 7th day, but those made from the liver proved positive up to the 39th day.

GLUSMAN (M. P.). **Negative Resultate bei Immunisierung von Meerschweinchen gegen Milzbrand nach der Methode von Besredka.** [Negative Results in the Immunization of Guinea-Pigs against Anthrax by Besredka's Method.]—*Ztschr. f. Hyg. u. Infektionskr.* 1924. Vol. 102. No. 1/2. pp. 218–223.

The author outlines BESREDKA'S original communication regarding the susceptibility of the skin of the guinea-pig to anthrax infection and their immunization by this path.

Four series of experiments were carried out. In the first of these ten guinea-pigs were treated with first vaccine by rubbing it into shaved skin with a cotton wool tampon. They received a second treatment a week later. After a further period of a week one of the guinea-pigs and one control were treated with second vaccine in the same way. Both died of anthrax. After a further week the remaining nine guinea-pigs were immunized for the third time with vaccine 1. On this occasion the vaccine was rubbed in vigorously. A few days later another of the guinea-pigs and a control were tested with second vaccine. Both died of anthrax. This was repeated with another of the vaccinated animals and a control.

With variations of dosage, etc., these experiments were repeated, but immunization was not achieved.

The authors are unable to find any explanation of the results in the technique or the material used. They suppose that there is some at present unrecognized factor in the production of active immunity which has not been taken into account.

VELU (H.). **Rapidité de l'immunisation du mouton contre le charbon bactéridien par intradermo-vaccination en un temps : possibilité de l'intervention chez les animaux en période d'incubation.** [Intradermal Vaccination of Sheep against Anthrax. The Possibility of Intervening when an Animal is actually in the Incubative Stage.]—*Bull. Soc. Path. Exot.* 1924. June 11. Vol. 17. No. 6. pp. 467–470.

Single dose vaccination against anthrax is the only method that is of practical value in colonies. The first experiments carried out by the author had for their object the determination of the interval elapsing between vaccination and the acquisition of immunity.

Four sheep were vaccinated cutaneously with a dose equal to that employed by the subcutaneous path. At intervals of 72, 48, 24, and 9 hours later they were given 1,000 minimum lethal doses of a culture of the Moroccan strain of the organism subcutaneously. At the same time a control received 5,000 m.l.d. Another sheep was inoculated simultaneously with vaccine into the skin and virus subcutaneously.

Four of the animals resisted infection, although two showed a slight rise of temperature. The animal inoculated 24 hours after vaccination died of anthrax after a period of incubation of 5 days.

With a view to the elimination of possible errors in technique, such as the passage of the vaccine into the subcutaneous tissue, the experiment was repeated. Four sheep were used, and the intervals elapsing between vaccination and test inoculation were 72, 48 and 24 hours, the fourth receiving the two doses simultaneously. Again the animal inoculated after 24 hours died of anthrax, and in this instance after

48 hours only. These results rather suggest that there is a period of susceptibility at 24 hours while before and after this there is a condition of resistance.

With a view to ascertaining whether a vaccine administered intradermally after infection had actually occurred would establish any protection an experiment was carried out as follows :—

Six sheep were inoculated subcutaneously with two carefully measured m.l.d. of culture. This small dose was selected with the object of causing slow development of the disease and thus facilitate observation.

The period of incubation generally runs from 3 to 5 days and deaths occur in 3 to 6 days.

These animals were then vaccinated intradermally 24, 48, 72, and 96 hours after inoculation. The remaining two acted as controls.

Three of the vaccinated animals (24, 48, and 96 hours interval) resisted infection and showed no local or general disturbance. The animal vaccinated 72 hours after inoculation died of anthrax. A rise of temperature, indicating invasion of the blood stream, had begun before the vaccination was carried out. Its death occurred 4 days after vaccination. The controls died 4 and 10 days after inoculation.

LISTON (W. Glen) & SOPARKAR (M. B.). **Bovine Tuberculosis in India. An Outbreak of Tuberculosis among Animals in the Bombay Zoological Gardens.**— *Indian Jl. Med. Res.* 1924. Jan. Vol. 11. No. 3. pp. 671–680. With 1 text fig.

An account of an outbreak of tuberculosis in the Zoological Gardens, Bombay, believed to have originated from one or more llamas imported from Germany. The disease during the course of a year was responsible for the death or destruction of 30 animals. These included spotted deer, llama, binturong, quail, urial, nilgai, sambar, antelope, Arabian gazelle, Malayan tapir, and Beisa antelope. The outbreak was confined to a single compound—and did not spread to others only a few hundred feet away.

The binturong mentioned was not in the infected compound, but was at some distance from it. The virus isolated from this animal was of the human type, while the whole of the other virus isolated were of the bovine type.

SOPARKAR (M. B.). **Bovine Tuberculosis in India. An Investigation into the Types of Tubercle Bacilli isolated from Animals during an Outbreak of Tuberculosis in the Bombay Zoological Gardens.**— *Indian Jl. Med. Res.* 1924. Jan. Vol. 11. No. 3. pp. 681–693.

The author isolated 9 viruses. Five of these were from spotted deer, one each from a llama, binturong, an antelope and a gazelle.

The strains were isolated either direct from lesions or after passage through guinea-pigs. When the material for inoculation showed a large number of accidental organisms the emulsion was mixed with an equal amount of normal sodium hydrate and incubated for half an hour at 37° C. The mixture was neutralized with 5 per cent. hydrochloric acid prior to its injection into guinea-pigs. Virulence tests were carried out with rabbits, using doses of ·01 mg.

The strain derived from the binturong could not be distinguished from the human type.

Strains from four spotted deer and a gazelle resembled the bovine type.

The bacilli isolated from the antelope possessed the cultural characters of the bovine type, but were less virulent.

Bacilli from one of the spotted deer and one of the llamas were dysgonic but of low virulence.

KAWAMURA (Y.). **Contributions to the Experimental Study of the Preparation of Blackleg Precipitin Serum.**—*Jl. Jap. Soc. Vet. Sci.* 1924. June. Vol. 3. No. 2. pp. 121–125. [Author's English Abstract.]

The author has tested the methods described by HECHT, MESSUER and LANGE, and OKUDA for the preparation of a blackleg precipitin serum and finds that the organic substances present in the material injected induce the formation of precipitins for " flesh proteins."

The author has therefore devised a broth which is not capable of producing protein precipitins. This has the following composition :—

Distilled water	1,000 cc.
Peptone	50 g.
Grape Sugar or Dextrose ...	50 g.
Sodium Chloride	5 g.

This is tubed and has added to it pieces of chicken liver. It is then sterilized. The method of sterilization is not stated. *B. chauvoei* is said to grow vigorously in this medium, and appears to decrease in virulence. This, it is said, is an advantage in using the cultures for immunization purposes. In the preparation of the precipitin serum the following procedure is adopted. Cultures are grown for 24 hours at 37° C. and then filtered through wire gauze. The filtrate is centrifuged to concentrate the bacilli. Five to eight intravenous injections are given in increasing doses at intervals of 5 to 7 days. Rabbits were used but no indication of the actual doses given appears in the author's abstract.

The serum is collected and stored in ampoules of 1 or 2 cc. capacity. In carrying out the test a piece of the suspected muscle is ground up with 5 to 10 volumes of salt solution. The mixture is kept at room temperature for 24 hours with occasional shaking. It is then filtered until perfectly clear. If cloudiness develops it must be heated in boiling water for 5–10 minutes and filtered through a Berkefeld filter.

The tests are kept at room temperature and are read at 3 hours. [It would appear from a table given that in some of the tests at least they were read at 10, 20, 30, and 60 minutes.] The author states that his serum is useful for the differentiation of *B. chauvoei* from *B. oedematis maligni*, *B. tetani*, *B. welchii* and the bacillus of chicken diarrhoea (NAKAMURA).

LECLAINCHE (E.) & VALLÉE (H.), GLOVER & PINCEMIN. **Charbon symptomatique et gangrène gazeuse chez les bovidés.** [Black-Quarter and Gaseous Gangrene in Bovines.]—*Rev. Gen. Méd. Vét.* 1924. July. No. 391. pp. 357–361.

Clinical observation and bacteriological investigations have shown that in the human subject the condition known as gangrenous septicaemia includes a variety of recognizably different infections. The authors express the view that the disease known as symptomatic

anthrax (black-quarter) is also not a single entity. Several authors have come to the same conclusion, and in the present paper they summarize the evidence collected regarding the true identity of all cases recognized as symptomatic anthrax. The typical *Bacillus chauvoei* is one which is the cause of gas gangrene in cattle, is devoid of pathogenicity for the horse, pathogenic for the calf and guinea-pig. In the latter species it does not form long forms of irregular length in the peritoneum, and is not agglutinated by an "anti-vibrion-septique" serum in dilutions weaker than 1 in 50. *Bacillus septicus*, on the other hand, is non-pathogenic for cattle by subcutaneous inoculation; is highly pathogenic for the horse and guinea-pig, and in the latter produces forms of variable length. It is not agglutinated beyond 1 in 50 by sera which agglutinate the *Bacillus chauvoei* in dilutions of 1 in 20,000 or even more.

The conclusion is therefore drawn that while *B. chauvoei* and *B. septicus* are closely related they can be differentiated. This conclusion has been confirmed by a number of other investigators.

Apart, however, from these clearly recognizable types, these have been encountered in cases of gas gangrene in cattle which clinically resemble black-quarter organisms, which in some cases approximate more or less to *B. septicus* and in others to *B. chauvoei.*

The organisms isolated from these cases have been subjected to systematic examination, and the results of the tests allow of the following deductions :—

In addition to a number of strains of *B. septicus* isolated from cattle, and devoid of all pathogenicity for this species and of all immunizing value against *B. chauvoei,* others have been encountered which morphologically and biologically are indistinguishable from the foregoing, but which are capable of causing lesions exactly like those of black-quarter in cattle. Injuries form the starting-point of these infections. Vaccination against *B. chauvoei* affords no protection. Such cases are due to *B. septicus.* The terms "pseudo-charbon symptomatique" and "charbon para-symptomatique" should be avoided.

Occasionally cases are encountered in which wound infection cannot be held to be the starting-point, the cases occurring just as cases of black-leg occur. From these organisms which appear to stand between *B. septicus* and *B. chauvoei* have been isolated. Many of these intermediate strains give cross immunity reactions. This is a point in favour of the employment of polyvalent vaccines.

BESREDKA (A.). **Pansements spécifiques. Etude sur l'immunité locale.** [Specific Dressings. Local Immunity.]—*Ann. Inst. Pasteur.* 1924. July. Vol. 38. No. 7. pp. 565–580.

The author's conclusions may be summarized as follows :—

Dead cultures of staphylococci injected subcutaneously confer a certain degree of immunity against skin lesions. If injected intradermally the effect is more marked. Filtered cultures act in the same way as entire cultures and their action is more marked. If filtrate be spread over a large area it confers immunity against a lethal dose of virus introduced subcutaneously. The action is rapid Dead cultures of streptococci introduced under the skin do not confer any immunity upon laboratory animals. If injected intradermally

they produce an immunity the strength of which is in proportion to the number of places at which the injections are made. Filtered cultures act in the same way; applied to or injected into the skin they protect against streptococci injected under the skin. Compresses soaked in filtrate applied to the skin of rabbits and guinea-pigs confer immunity against local infection and against fatal infection by subcutaneous inoculation.

EVANS (Alice C.). **The Nomenclature of the Melitensis-Abortus Group of Bacterial Organisms.**—*Public Health Reports.* 1923. Aug. 24. Vol. 38. No. 34. pp. 1943–1948.

DISEASES DUE TO FILTERABLE VIRUSES.

DE KOCK (G. v. d. W.). **A Contribution to the Study of the Virus, Haematology, and Pathology of Infectious Anaemia of Equines under South African Conditions.**—*Union of South Africa, Dept. of Agric. 9th & 10th Rep. Director Vet. Research. April 1923.* pp. 253–313. With 4 plates and 15 charts. (1924. Pretoria: Govt. Printing & Stationery Office.)

Infectious anaemia does not appear to occur as an enzootic in South Africa, and since only isolated cases occur it is sometimes not recognized and is confused with piroplasmosis. As a result of this its geographical distribution is not definitely known. It does not appear to be associated with any particular environment, nor has it a seasonal occurrence.

Diagnosis is a matter of some difficulty for the reason that very inconsistent results have been obtained in experiments designed to test the transmissibility of the disease.

Recovery appears to confer immunity, but the blood of recovered animals retains its virulence for long periods. In one case, the blood of an animal was found to have retained its full virulence seven years after the attack.

The reduction in the number of red corpuscles is a gradual one, and the number per cubic millimetre may fall below two million. In recovered animals which are carriers the blood appears to be free from pathological changes.

The lesions are usually somewhat inconspicuous. The organs principally affected are the liver, kidneys, and heart. Information is lacking regarding the condition of the spleen. In the liver congestion, fatty degeneration and pigmentation are the principal abnormalities encountered. In the uriniferous tubules fatty degeneration has been encountered along with pyknosis of the nuclei. In acute cases degeneration of the myocardium was regularly found.

NAGAO (M.). **Beiträge zur Kenntniss von der pathologischen Veränderungen der roten Blutkörperchen bei der infektiösen Blutarmut der Pferde.** [The Pathological Changes in the Red Blood Corpuscles in Equine Infectious Anaemia.]—*Jl. Jap. Soc. Vet. Sci.* 1924. June. Vol. 3. No. 2. pp. 99–111.

As a rule the blood corpuscles begin to fall in number during the first four days of illness. But the reduction stands in direct relationship

to the degree of fever and the duration of the febrile attack. But it does not necessarily continue throughout the period of fever. The blood count after the primary drop may remain at a constant level although the fever persists. Then, as the temperature returns to normal, there may be a slight rise in the count. In animals that have recovered clinically there appear to be no distinct abnormalities in the blood counts.

During the disease the red corpuscles show changes in resistance. Their resistance increases during the early phases of the disease, and is closely connected with the reduction in number of the corpuscles.

Nucleated red corpuscles always make their appearance, usually during the second week. Their appearance coincides with the maximum degree of resistance of the red cells.

Red corpuscles containing Jolly bodies make their appearance along with the nucleated red cells.

Cells showing punctate basophilia have rarely been encountered. Corpuscles showing polychromatophilia appear at the same time as the erythroblasts, but with the exception of one case out of the ten examined the number was very small. Five of the affected horses were examined post-mortem, and in the red marrow of the long bones a marked increase in the number of red and white blood corpuscles was found.

LEGER (Marcel) & TEPPAZ (L.). **Le " Horse-Sickness " au Sénégal et au Soudan Français : Documents historiques, cliniques et épizootiques.** [Horse Sickness in Senegal and in the French Soudan. Historical, Clinical and Epidemiological Details.]—Extrait du *Bulletin du comité d'Etudes historiques et scientifiques de l'Afrique Occidentale Française.* 1922. Apl.-June pp. 1–22. With 2 charts.

The first outbreak of an acute and fatal disease among the horses began on September 16, 1921.

Between this date and the end of December 200 French horses and two mules died. It is not quite clear whether the arab horses were affected as the figure given for their strength is 26, both before and after the epizootic. Later, it is stated in the text, that 11 out of 26 of these died. It appears, therefore, that the original strength must have been 37.

The outbreak at Dakar in 1921 was a particularly severe one, but the disease has been known to occur in Senegal and Upper Senegal for the last 40 years. The earliest description appears to be that by KORPERS, who described outbreaks in 1882 and 1884 in the Soudan. Since those days the disease has been described by a number of observers, and their accounts of the symptoms leave no room for doubt that, although given a variety of names, the condition was actually horse sickness.

Peracute and acute forms are recognizable. In the former death takes place suddenly with little or no warning. The acute form terminates fatally within 48 hours, as a rule, but exceptionally the animal survives 4 or 5 days.

The existence of a febrile period before the onset of symptoms has been established by the systematic taking of temperatures. In some cases temperatures up to 40°C. have been registered for two or three days before the onset of clinical symptoms. The latter are those observed in cases of the disease in South Africa and elsewhere.

Occasionally relapses occur in horses which appear to be on the way to recovery. These manifest the same sudden onset as in the primary attacks.

The presence of a lemon yellow exudate in the pericardium is almost invariably found at the post-mortem. This varies in amount up to a maximum of about a litre. The bronchi contain blood-tinged froth. The lungs are hepatized. The gastric mucous membrane shows petechiae, particularly around the pylorus. The liver is of an olive yellow colour, and shows small subcapsular haemorrhages. The kidneys are congested, and on section show a small amount of viscous urine which has a strong ammoniacal odour.

In the matter of preventive treatment the authors tried serum from animals which appeared to be on the way to recovery but which actually died as a result of relapses. The serum did not appear to exercise any protective action.

No experiments were carried out with a view to the establishment of the cause of the disease.

A number of flies caught on both healthy and infected horses were dissected, and in the stomachs of these crithidia were found. No connection between these and the disease was traced. The flies were examined by ROUBAUD, who declared them *Lyperosia thirouxi* and *Lyperosia minuta*.

DONATIEN (A.) & LESTOQUARD (F.). **L'anémie pernicieuse du mouton et de la chèvre.** [Pernicious Anaemia of the Sheep and the Goat.] —*C. R. Acad. Sci.* 1924. June 23. Vol. 178. No. 26. pp. 2203–2204.

The disease described has been observed by the authors among sheep and goats intended for experimental investigations in Algeria. It is characterized by irregularity of temperature, anaemia, rapid loss of condition, and the general lesions of cachexia. The disease almost invariably terminates fatally.

No causal organism has been demonstrated either with the microscope or by culture. The disease is readily transmissible to sheep and goats by blood, serum, or urine inoculation. The virus is a filter passer. A minute dose is sufficient to produce infection. Recovery appears to produce no immunity since an animal which has reacted to an initial inoculation will react again to a second.

The disease produced experimentally agrees in all its characters with the natural infection. The course of the disease ranges from ten days to several months.

In addition to the general condition of cachexia there may be found in cases which terminate suddenly the lesions of a septicaemia. Non-specific broncho-pneumonia is sometimes found.

Lesions are always present in the suprarenal bodies, and take the form of haemorrhages, leucocyte infiltrations, and changes in the parenchyma cells.

Two attempts to transmit the disease to the ass by intravenous and subcutaneous inoculations have succeeded, and it has also been found possible to carry on the disease in cases in series and to transmit it back from the ass to the sheep. Similar successful inoculation experiments have been carried out with calves.

METTAM (R. W. M.). **Snotsiekte in Cattle.**—*Union of S. Africa. Dept. Agric. 9th & 10th Rep. Director Vet. Education & Research. April 1923,* pp. 395–432. With 1 plate. (1924. Pretoria: Govt. Printing & Stationery Office).

Snotziekte is an acute specific disease of cattle caused by an ultramicroscopic but non-filtrable organism. It is characterized by general hyperplasia of lymphoid tissue throughout the body. In some cases there is necrosis and subsequent erosion of mucous membranes.

The condition does not appear to be a common one, but it appears sporadically causing heavy losses. It would seem that formerly it was far more common than at present. Animals of all ages are susceptible, but the condition appears to be specific for bovines. It has been observed to be transmitted from wildebeest to cattle, and it has been passed from sick to healthy cattle by intravenous and subcutaneous inoculation with blood. A single observation indicates that the wildebeest may act as a carrier. But in a few cases in which recovered cattle have been available for experimentation the indications have been that recovery, when it takes place, is complete. It has been found that the disease may make its appearance when cattle and wildebeest are herded together, and in one case the blood of wildebeest was infective, but in no instance have symptoms of infection been seen in the wildebeest.

Under natural conditions the period of incubation is about a month. In the experimentally produced disease it has varied from two to four weeks. The disease is characterized by high temperature, profuse discharge from the eyes and nose, and congestion of the mucous membranes, which later show areas of necrosis and erosions. Opacity of the cornea is of frequent occurrence. The lymphatic glands are all enlarged and indurated but not painful.

Prior to death, which occurs in from 4 to 10 days, the temperature falls to about 103°. Death is preceded by coma. Constipation is pronounced. The congestion and erosion are not limited to the visible mucous membrances. Lesions of this type in the upper air passages and in the abomasum.

Histological examination reveals the presence of hyperplasia of the lymphoid tissues, and infiltrations of lymphocytes in the parenchyma of the organs, especially in situations closely related to blood vessels.

The virus, as has already been mentioned, while ultravisible, is non-filtrable. The evidence obtained indicates that it is related to the red blood corpuscles. Two hours' exposure at 70°C. is sufficient to destroy it. It may be preserved in an ice chest for fourteen days, but after this period it rapidly dies out.

Recovery is apparently of rare occurrence, and when it occurs after a mild attack it leaves no immunity. In experimental cases (70 in number) the mortality was 97 per cent.

REMLINGER (P.). **Contribution à l'étude de l'action de la glycérine sur le virus rabique.** [The Action of Glycerin on the Virus of Rabies.]—*C. R. Soc. Biol.* 1924. Jan. 25. Vol. 90. No. 2. pp. 70–72.

The author gives a brief account of experiments in which the action of glycerin was tested upon the brains of rabbits dead of rabies, due

both to fixed and street virus and in the fresh and partly dried condition. From these he concludes that when a rabic brain is immersed in glycerin the persistence of the virus in the centre of the nerve tissue depends upon the bulk of the piece immersed.

He found that virus dies more rapidly in spinal cord than in brain although the fragments immersed were the same size.

Fragments subjected to desiccation in Pasteur flasks for 2 or 3 days prior to being placed in the glycerin lost their virulence more rapidly than pieces immersed when perfectly fresh.

REMLINGER (P.). **L'huile d'olives peut-elle remplacer la glycérine pour la conservation du virus rabique ?** [Can Olive Oil be used in the Place of Glycerin for the Preservation of the Virus of Rabies ?]—*C. R. Soc. Biol.* 1924. June 20. Vol. 91. No. 21. pp. 59–61.

On the score of economy an attempt was made by the author some twenty years ago to replace glycerin by olive oil for the preservation of the virus of rabies. Olive oil was selected merely because of some similarity of consistence. It was found to be a failure, as it was devoid of antiseptic properties.

Recently a note was published by GONSALVES to the effect that the two halves of a rabic brain were preserved respectively in glycerin and olive oil and that these produced rabies in rabbits after 56 and 95 days, death taking place in from 6–9 days.

Remlinger has repeated the experiments originally carried out in Turkey, with the same results as before.

REMLINGER (P.) & BEL (P.). **Inefficacité de l'urotropine comme médicament préventif ou curatif de la rage.** [The Uselessness of Urotropine for the Preventive or Curative Treatment of Rabies.]—*C. R. Soc. Biol.* 1924. May 23. Vol. 90. No. 17. p. 1312.

Two groups of 7 guinea-pigs were inoculated intramuscularly in the back of the neck with a particularly virulent strain of street virus. These were treated with repeated injections 2·5 cc. of 20 per cent. urotropine subcutaneously, and intracranially 0·5 to 1 cc. of the same solution respectively. The former were injected daily, and the latter, which were treated by both methods, every other day. A third similar batch was kept for controls.

All the animals injected both subcutaneously and intracranially died. One only of these injected subcutaneously survived. Two out of the seven controls survived. The injections of urotropine were continued until just before death occurred.

BÉDIER (E.) & CHASSIGNEUX (A.). **Au sujet de quelques accidents observés à Dakar au cours des passages de virus rabique.** [Accidents encountered at Dakar during Passages of the Rabic Virus.]—*Bull. Soc. Path. Exot.* 1924. June 11. Vol. 17. No. 6. pp. 511–514. With 1 text fig.

In view of REMLINGER'S experiences in Tangier regarding the occurrences of unexpected sequelae following the inoculation of rabbits with the virus of rabies, the authors detail similar accidents which have come under their notice during the last two years.

The virus used at Dakar for the treatment of rabies was obtained from Tangier in 1921, and at the time of writing was in its 39th passage.

During the last two years 63 rabbits have been inoculated intracranially. Of these 44 died of rabies between the 7th and the 25th days, 13 died accidentally within 48 hours and 6 failed to become infected. Of 21 rabbits inoculated into the anterior chamber of the eye 16 died of rabies in 12 to 16 days, four failed to become infected, and the remaining died on the 93rd day, having developed torticollis and chorea. The failures to infect were not due to loss of virulence of the virus, as was proved by the fact that positive and negative results were obtained with the same emulsion.

Attention is drawn to the variation of the period of incubation, and the point is insisted upon that all the untoward results were obtained during the hot, wet seasons, that is to say during August and September, 1922, and September and October, 1923. The virus became normal in behaviour with the return of cool weather.

Since in isolated places it is impracticable to obtain fresh virus when such accidents occur, the indications are that during what may be called the danger period the number of animals inoculated should be increased.

STIRLING (R. F.) & PILLAI (R. V.). **Atypical Rabies.**— *Vet. Jl.* 1924. Aug. Vol. 80. No. 8. pp. 318–320.

The case described occurred in a dog and apparently followed a clean cut wound in the buttock. The wound was believed to have been caused in some way by the dog chasing a cat through a bamboo clump. It healed in 5 or 6 days without any suppuration. About a month later the dog suddenly became ill and showed signs of distress. Its temperature was found to be 107·2°. Piroplasms were found to be fairly numerous in its blood. During the next few days he became dull and listless, and sought dark corners. He ate and drank sparingly. He showed no dropping of the jaw or weakness of the loins. Later a blood tinged nasal discharge and dysentery developed. On the 11th day of illness death occurred.

At the post-mortem examination the following lesions were noted ·—

Streaks of congestion in the pharynx, larynx and trachea. Small areas of consolidation in the lungs. Areas of congestion in the stomach. There was a small adhesion between two parts of the intestine causing partial obstruction. The liver was congested. The brain was apparently normal. Sections of the hippocampus were examined and Negri bodies were found in abundance.

LEVADITI (C.), NICOLAU (S.) & SCHOEN (R.). **La nature du virus rabique fixe.** [The Nature of the Fixed Virus of Rabies.]— *C. R. Acad. Sci.* 1924. June 20. Vol. 91. No. 21. pp. 56–58.

The Negri bodies are held to be the pansporoblast stage of the virus of rabies, and the authors have attempted to discover whether the fixed virus could be placed in conditions which would permit it to recover its power of pansporoblast formation, that is to say, its capacity for producing Negri bodies.

Fixed virus was used for the intracranial inoculation of a rabbit, and when this animal died on the 9th day its brain was used for the cerebral inoculation of a monkey. This also died on the 9th day. The virus from this monkey was passed on to another by intracranial inoculation. In rabbits inoculated intracranially with the brain substance of this monkey death took place in from 8–12 days. No Negri bodies were discovered.

It is not quite clear exactly what was done in the next passage as the brain used is said to be that of cynomolgus 15, whereas the *Macacus cynomolgus* previously referred to was No. 45. This is possibly a misprint, and it appears to be probable that the animals 15 and 45 were one and the same. The brain was used for the intracranial inoculation of a chimpanzee. Death took place on the 12th day, when the virus was passed on again to rabbits. Severe lesions of the nervous system were produced, but no Negri bodies could be found. No definite opinion is expressed whether the loss of power to form pansporoblasts is permanent, but the suggestion is made that inoculation with fixed virus from the rabbit should be carried on in a series of dogs. The loss of the power is considered to be a mutation.

SZYMANOWSKI (Z.) & SIENCZEWSKI (St.). **Contribution à l'étude de l'immunisation des chiens contre la rage.** [The Immunization of Dogs against Rabies.]—*C. R. Soc. Biol.* 1924. Mar. 21. Vol. 90. No. 10. pp. 697–699.

Thirteen dogs have been treated by SEMPLE'S method, each having been given 20 subcutaneous injections of 5 cc. in the course of 3 weeks. After a lapse of 10 days the vaccinated dogs and 9 new dogs were given intramuscular injections of 5 cc. of brain emulsion of a dog dead of street rabies. In the course of 6 weeks one dog of each batch died. Six weeks later 5 vaccinated and 4 control dogs were again injected intramuscularly with street virus. Only two dogs, both vaccinated, died. Ten weeks later two dogs which had been vaccinated and infected once were again inoculated; on this occasion one was inoculated intracranially. This animal died on the 6th day.

Three controls which had previously been infected once were again inoculated and resisted infection.

The brains of the dogs which died were tested by inoculation of rabbits. Furious rabies developed.

MISCELLANEOUS.

THEILER (Arnold), DU TOIT (P. J.) & MITCHELL (D. T.). **Gousiekte in Sheep.**—*Union of South Africa. Dept. of Agric., 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 9–105. With 4 plates and 1 text fig. (1924. Pretoria: Govt. Printing and Stationery Office.)

Gousiekte, meaning sudden sickness, is a disease of sheep due to the ingestion of *Vangueria pygmaea* (Rubiaceae). The plant contains a toxic principle which causes myocarditis with subsequent dilatation of the ventricles, thus leading to heart failure.

In about 30 per cent. of cases death occurs within 24 hours of the onset of symptoms. In about 50 per cent. affected animals may survive for periods ranging up to a week. In the remainder they may live for more than a week. Recovery is highly exceptional. Lagging behind the flock is first observed. Then animals will be found lying with the head and neck extended. Accelerated respiration is a most marked symptom, and this may be accompanied both on inspiration

and expiration by a moaning or grunting sound. In the less acute cases, in which the sheep are still standing, causing them to move or hurry brings on marked symptoms very rapidly.

The disease is non-febrile. The nature of the toxic principle has not as yet been determined.

LEGG (J.). **The Gilbert River Horse Disease.**—*Queensland Agric. Jl.* 1924. June. Vol. 21. No. 6. pp. 416–419.

This disease, as its name implies, occurs in certain areas along the Gilbert River in Queensland, and it does not appear to have been encountered with certainty anywhere else. The disease appears to be most serious at places where horses are confined in paddocks along the river flats. It occurs only in the wet season, and its onset coincides with the onset of the rains. There are some indications that the severity of the disease varies with the heaviness of the rains, but it cannot be said with certainty that this is so.

The description of the symptoms given by the author is based upon his own observation of a few cases, and upon accounts given by others.

In the early stages dullness and sleepiness are observed, the affected animals tending to separate themselves from their fellows. While in this condition periods of brightness are noticed during which the animals appear to rouse themselves. They soon, however, relapse into dullness again. Yawning is frequent. The period of depression is followed by a phase of violence which lasts on an average twenty-four hours. The degree of violence is generally inversely proportional to the length of the attack. Once this phase is established the animal tends to move forwards either in a straight line or in circles, taking no notice of obstacles in its path. At the post-mortem examination the liver usually has a greenish-yellow or greyish-green colour, and may have a mottled appearance, which is due to minute haemorrhages into the liver tissue. On microscopic examination the author found evidence of cirrhosis.

The stomach is enormously distended with food, and in one case seen death was actually due to rupture of that organ. The mortality is very high. It appears to be highly exceptional for recovery to take place when symptoms of violence have made their appearance.

Definite experiments regarding the causation of the disease have not been carried out, but in the author's opinion the close resemblance which the condition bears to diseases encountered in New Zealand and in South Africa suggests a similarity of cause, viz., plant poisoning of some kind, probably Senecio.

DU TOIT (P. J.). **Sweating Sickness in Calves (Preliminary Report).**—*Union of S. Africa. Dept. of Agric., 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 233–250. With 2 figs. & 13 charts. (1924. Pretoria : Govt. Printing & Stationery Office.)

The information contained in this preliminary note was gathered in 1922 in the course of a visit to an infected farm.

The cause of the condition has not yet been detected.

As is indicated by the name, the disease attacks calves, and the most prominent symptom is sweating. Its existence appears to have been recognized in various parts of Rhodesia and South Africa for some ten years. At the post-mortem examination naked-eye lesions are inconspicuous in the internal organs. Microscopic examination

reveals the presence of a marked haemorrhagic glomerulo-nephritis. The disease occurs during the hottest months of the summer and may have a mortality as high as 75 to 80 per cent.

Up to the present all attempts to transmit the disease experimentally by inoculation, contact, etc., have failed. There is, nevertheless, some evidence to suggest that the disease is actually infectious.

While the disease is certainly one of the hot weather, there appears to be no co-relation between mortality and rainfall. Altitude appears to be without influence upon its occurrence.

In the absence of knowledge regarding the actual course of the disease it is useless to speculate regarding the mode of transmission, but the author believes that some form of carrier is responsible.

The onset of the disease is, as a rule, sudden, and is marked by a sudden rise of temperature, which, however, soon drops again to normal. The skin over the body feels hot, but the extremities are cold. Sweating sets in at an early stage, and the areas chiefly affected are the cheeks, the base of the ears, sides of the neck, behind the elbows, flanks and inguinal regions. Actual sweating can, as a rule, be seen in the early morning only. Later in the day no moisture can be detected, but the skin is hot and clammy and the hair has a matted appearance. Lachrymation, followed by conjunctivitis and salivation, are frequently noted. Erosions of the buccal mucous membrane follow. There appears to be no disturbance of the digestive system.

Death may take place in 2 to 4 days, or the symptoms may abate within a week and complete recovery take place within the following fortnight.

GREEN (H. H.) & ANDREWS (W. H.). **The Toxicity of** *Adenia digitata* **Burtt-Davy** (*Modecca digitata* **Harv.**).—*Union of S. Africa. Dept. of Agric., 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 381–392. (1924. Pretoria: Govt. Printing and Stationery Office.)

The root of this plant bears a close resemblance to a large turnip and also edible roots such as Coccinea. It is to this fact that cases of poisoning among human beings have been attributed.

Chemical and physiological examination showed that the fresh root contained a cyanogenetic glucoside, equivalent in amount to 0·04 per cent. hydrocyanic acid. There was also present an enzyme causing rapid hydrolysis so that air-dried root in moderate quantities does not produce cyanic intoxication. There was also isolated a toxalbumin which was resistant to desiccation, and which could be readily extracted from the dried root with water or salt solution. This was exceedingly poisonous for man, sheep, dog, rabbit, guinea-pig, and rat, and probably other animals. This was precipitable by ammonium sulphate or alcohol above 50 per cent., and coagulated at 60° to 70° C.

For rabbits and guinea-pigs the fatal dose of the fresh root is a few grammes, and for the sheep about half a pound.

Experiments indicated that by inoculation the lethal dose was very small, even though the pure phytotoxin was not injected.

Large doses administered by the mouth produce acute haemorrhagic gastro-enteritis. After subcutaneous injection the lesions found are cessation of the heart in diastole, congestion of the kidneys, incipient degeneration of the liver, slight gastro-enteritis and oedema at the seat of inoculation.

With very small doses these lesions are not recognizable.

MOUSSU (Raymond), GIRAUDEAU, & MAUBARET. **Recherches sur la nature et le traitement de la jaunisse des muletons nouveau-nés.** [The Nature and Treatment of Jaundice in New-born Mules.]— *C. R. Soc. Biol.* 1924. June 20. Vol. 91. No. 21. pp. 68–69.

This disease is characterized by jaundice and usually by the passage of red or brown urine. It proves fatal in at least 50 per cent. of cases.

The authors' observations lead them to look upon the disease as one of maternal origin. A mare which has given birth to a mule foal which becomes affected with jaundice will probably do the same thing again, but a horse foal from such a mare will not be affected.

Microscopic examination of the blood reveals the typical picture of a severe anaemia. They have detected nothing to account for this. They believe that hybridization upsets the equilibrium of the blood and that the corpuscles are extraordinarily fragile.

Acting upon this idea, treatment is directed towards re-establishing equilibrium in the blood and increasing its coagulability, which is always low.

Three types of treatment have been tried :

(*a*) Injections of 20–30 cc. of horse serum (third bleeding) intravenously. The results have not been good. The mortality has been about 30 per cent.

(*b*) Intravenous injections of 20 to 30 cc. of horse serum with 100 to 150 cc. of citrated mule blood. Results negative. No change in percentage mortality.

(*c*) Intravenous injections of mule serum. The intravenous injections of mule serum into ailing mule foals has yielded surprising results. Ninety per cent. of cases have recovered. The dose used was 50 cc. and it was warmed to body temperature. The effect is observed within an hour or two, and recovery, except for persistent discolouration of the membranes, is complete within 2 to 3 days.

The success of this treatment has led the authors to give injections with a view to preventing the onset of the disease. A minimum of 50 cc. is necessary, and mule foals, the progeny of mares whose previous foals were affected, have remained healthy.

NESER (C. P.). **The Blood of Equines.**— *Union of S. Africa, Dept. of Agric., 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 481–556. With 4 plates in colour and 13 graphs. (1924. Pretoria : Govt. Printing and Stationery Office.)

The author points out that while a considerable amount of work has recently been done in connexion with the blood of the human subject, little or none has been devoted to the blood of animals.

The present work is a preliminary study of the blood of equines.

The paper is divided into 8 sections, dealing with (1) Technique, (2) Preliminary observations on the erythrocytes of equines and the accuracy of the figures obtained, (3) Main observations on the erythrocytes of the horse and those of the donkey and mule compared with these, (4) The blood of equines in stained smears, including the classification of the leucocytes, (5) Number and differential counts of leucocytes of the horse, (6) Leucocytes of the donkey, mules, mares in and with foals, and foals compared with those of the horse, (7) Summary, and (8) Discussion.

The author finds that in obtaining an estimate of the number of red corpuscles present in a sample of blood more constant, and therefore, presumably, more accurate results are obtained by centrifuging than by actual counting. He has constructed the formula

$$\frac{\text{percentage volume of red cells}}{4{\cdot}35} = \text{number of erythrocytes per c.mm. expressed in millions.}$$

Regular exercise has a very marked effect upon the corpuscular content of blood. Racehorses in full training show a blood count three times as large as stabled animals. The influence of sex, age, breed, etc., was very slight as compared with regular exercise. Nor were moderate starvation or thirst, food, water, or moderate exercise found to influence the blood counts to anything like the same extent as regular exercise. Exercise also causes an even distribution of the white corpuscles. It was observed that a draught of water following a period of thirst resulted in an increase of eosinophiles in the jugular blood. Foals shortly after birth, and mares before and after foaling, showed a remarkably high percentage of neutrophiles. The counts became normal within two months.

In the blood of donkeys the counts for lymphocytes and neutrophiles are reversed as compared with those of the horse, and the eosinophile count is higher.

YOKOTA (Kiyoshi). **Méthode de coloration des cils.** [Method of staining Cilia.]—*C. R. Soc. Biol.* 1924. May 23. Vol. 90. No. 17. pp. 1303–1304.

The author insists upon the necessity of using bacteria in the water of condensation of agar cultures for getting satisfactory results.

For aerobes, the cultures should be grown upon faintly alkaline agar for 18 to 24 hours at 33–35° C. The water of condensation is centrifuged for about 30 minutes. The sediment is mixed with salt solution containing 0·5 per cent formalin. This formalin fixes the cilia. The author finds that heating films to 65° C. for 10 minutes causes the cilia to become detached.

To a 5 per cent. solution of tannic acid is added drop by drop saturated solution of tartar emetic until the liquid becomes milky. This solution keeps for a month. This is the mordant.

The stain is made up by adding to 30 cc. of anilin water 1 cc. of a concentrated solution of fuchsin (? alcoholic.—ED.).

A thin smear is made on a slide and allowed to become dry. It is then fixed by heat. The film is covered with the mordant and heated over the Bunsen until the liquid just boils. The preparation is well washed in running water and covered with the stain. Heat is again applied until the stain just boils. The specimen is again washed, then dried and is ready for examination.

BERDNIKOW (A.). **Limite du développement des microbes dans les milieux artificiels.** [The Limits of Multiplication of Microbes in Artificial Media.]—*C. R. Soc. Biol.* 1924. May 23. Vol. 90. No. 17. pp. 1305–1306. With 1 text fig.

This article describes a method of testing the repeated cultivation of yeasts in media previously used for growing them in. It was found

that a medium used for a primary culture would give rise to some growth when it was reinoculated, but this did not take place with second and third subcultures.

OGUNI (H.). **Comparative Studies on the Methods of preparing Serum.** —*Jl. Jap. Soc. Vet. Sci.* 1924. June. Vol. 3. No. 2. pp. 97–98 [Author's abstract].

The author has carried out experiments with various types of apparatus for the purpose of ascertaining by which method the maximum yield of blood serum is obtained. He specifies that the apparatus tested have been

(1) That used at the Pasteur Institute, Paris.

(2) The bucket for blood clotting designed by the Laboratory of the Indian Civil Veterinary Department. [Presumably that designed in 1920 for the Imperial Bacteriological Laboratory, Muktesar.]

(3) Latapie's apparatus.

He finds that the yield of serum depends upon the "individuality" of animals, and the total amount of serum obtained from clot at intervals of two days over a period of nine days is 41–64 per cent. The percentage of serum from a first bleeding of 4,000 cc. was lower by 6·5 per cent. than from a similar second bleeding taken two days later.

Slight starvation was not found to affect the serum yield.

The "adequate" temperature for the preparation of serum is 20° C.

In clotting methods the yield of serum is proportional to the height of the cylinder used.

The compressive method employed at Buitenzorg, Java, is the most suitable for horse and pig blood. This gives a yield higher by 4–13 per cent. than the usual clotting method, and the serum is free from haemoglobin. The Indian type of bucket is best for cattle blood, though contamination sometimes occurs, and there may be a slight admixture of blood corpuscles.

FAURE (Ch. L.). **Sur une technique de coloration rapide par l'hématoxyline au fer.** [A Rapid Method of Staining with Iron Haematoxylin.]—*C. R. Soc. Biol.* 1924. Jan. 25. Vol. 90. No. 2. pp. 87–88.

The method gives the best results after fixation by Bouin or alcoholic Bouin. Two solutions are required. The first is a modification of TRIBONDEAU'S silver haematoxylin and the second is a modified form of the solution devised by MOREL and BASSAL.

These solutions are made up as follows:

Solution A. Two grammes of crystalline haematoxylin are dissolved in 60 cc. of 90 per cent. alcohol. This solution is poured on to oxide of silver precipitated from the nitrate by caustic potash (as in the preparation of Borrel's blue). The mixture is heated over a water bath (to what extent is not stated) and then filtered.

Solution B. Two parts of official perchloride of iron solution, 2 parts of pure hydrochloric acid, 2 parts of a 4 per cent. solution of copper acetate and 94 parts of distilled water.

Equal parts of each are mixed just before use. The stain is allowed to act for 4 or 5 seconds. Wash under the tap. Place for 2 seconds in 1 per cent. hydrochloric acid. Wash. Place in a saturated solution

of carbonate of lithium for 2–3 seconds. Wash. Counterstain, and mount. The results resemble those obtained by Heidenhain's method, but they are not so perfect.

VAN ZYL (J. P.). **Note on the Composition of Various Samples of Arsenite of Soda.**—*Union of S. Africa. Dept. of Agric. 9th & 10th Rep. Director Vet. Education & Research. April 1923.* pp. 777–780. (1924. Pretoria: Govt. Printing & Stationery Office.)

——. **On the Determination of Arsenic, chiefly in Dipwashes.**—*Idem.* pp. 783–795.

——. **Oxidation in Arsenical Dipping Tanks.**—*Idem.* pp. 799–808. With 11 charts.

BOOK REVIEW.

VELU (Henri) [Chef du Laboratoire de Recherches du Service de l'Élevage du Maroc.] & BAROTTE (Jean) [Laboratoire de Recherches des T.O.M. à Casablanca.]. **Éléments pratiques de pathologie vétérinaire exotique. Applications du laboratoire en médecine vétérinaire.**—pp. iii+435. With 21 text figs. 1924. Paris: Émile Larose, Libraire-Éditeur, 11, rue Victor-Cousin.

This book is divided into two main parts: the first deals with generalities, and the second with specific conditions.

The first portion amounts to 135 pages, and deals with laboratory methods, including a description of the laboratory equipment necessary for the practitioner in tropical countries.

The second portion comprises eight chapters, dealing with blood parasites, filterable viruses, bacterial diseases, endo- and ecto-parasites, vegetable poisons, diseases of obscure origin and vaccines and sera.

The book does not profess to be a complete scientific treatise on the subject dealt with, but aims rather at emphasizing the close relationship between laboratory and field investigations, and at equipping veterinary officers with the requisite knowledge of laboratory technique, and thus rendering their field work the more effective.

In view of the aim of the book references are reduced to a minimum.

It is obvious that it is impossible to deal in very full detail with the subjects covered by the second part of the book in the space of some three hundred pages. The information may be said to be given very largely in tabular and tabloid form, but this method serves the purpose of the book admirably.

A. Leslie Sheather.

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Compiled by MISS M. H. JAMES.

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* The numbers in heavy type refer to the titles of papers summarized.

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REPRINTS AND PAMPHLETS RECEIVED.

ACKERT (James E.). On the Habitat of *Ascaridia Perspicillum* (Rud.).—*Jl. Parasit.* 1923. Dec. Vol. 10. pp. 101–103.

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

CURSON (H. H.). The Causal Organisms of Nagana.—3 pp. [Typewritten MS.] Communicated to the S. African Assoc. for the Advancement of Science at their July, 1924 Meeting, Capetown, by Dr. H. B. Fantham.

——. Notes on *Glossina pallidipes* in Zululand.—*Bull. Entom. Res.* 1924. May. Vol. 14. Pt. 4. pp. 445–453. With 4 plates.

DUERDEN (J. E.) & RITCHIE (M.). Kemp Fibres in the Merino Sheep.—*Union of S. Africa Dept. of Agriculture Science Bull. No.* 34. 1924. 13 pp. With 10 figs.

HOBMAIER (M.). Zur Entstehung des Haemomelasma ilei et jejuni des Pferdes.—*Muench. Tierärzt. Woch.* 1924. Vol. 75. No. 25. 4 pp.

KRANEVELD (F. C.). Bijdrage tot de therapie der distomatosis in Ned. Indië.—*Veeartsenijkundige Mededeeling No. 49. Department van Landbouw, Nijverheid en Handel.* 62 pp. Archipel drukkerij Buitenzorg.

MERKENS (J.). De veeteelt in Nederlandsch-Indië.—*Ibid. No. 47.* 51 pp. With 4 charts & 4 maps.

PFEILER. Bemerkungen zu verschiedenen Seuchenfragen, insbesondere zur Züchtung des Erregers der Maul- und Klauenseuche.—Reprinted from *Prakt. Landwirt.* 1924. June 6. No. 23. 2 pp. With 2 text figs.

ROBERTSON (W. A. N.). Rinderpest in Western Australia, 1923.—*Commonwealth of Australia, Dept. of Health, Service Publication* (*Vet. Hygiene*). *No. 1.* 58 pp. With 9 plates, 5 maps & 19 charts.

SHARIF (Mohammad). The External Morphology and Bionomics of the Commonest Indian Tick (*Hyalomma aegyptium*).—*Agric. Res. Inst. Pusa.* 1924. Bull. No. 152. 23 pp. With 5 plates.

SMIT (H. J.). *Paramphistomum explanatum.*—*Veeartsenijkundige Mededeeling No. 46. Departement van Landbouw, Nijverheid en Handel.* 6 pp. With 2 figs. Archipel drukkerij Buitenzorg.

—— & DJAENOEDIN (R.). De relatieve waarden der witte bloedlichaampjes bij paard, rund en karbouw in Ned. Indië.—*Ibid. No. 48.* 21 pp.

—— & NOTOSOEDIRO (R.). Eenige strongyliden onzer huisdieren.—*Ibid. No. 46.* pp. 7–14. With 4 figs.

STEKHOVEN (J. H. Schuurmans), Jr. De bloedzuigende arthropoda van Nederlandsch Oost-Indië. V. De bestrijding der luisvliegenplaag. VI. De teeken van de kleine Soenda-eilanden.—*Ibid. No. 45.* 46 pp..

TIMONEY (T. M.). The Bionomics of the Sarcoptic Mange Parasite of the Buffalo, with some Observations concerning the Relative Power of Resistance to Adverse Conditions of the Different Stages of the Acarus and of its Egg.—Reprinted from the *Proc. Fifth. Entom. Meeting.* pp. 180–200. With 4 plates. Bull. No. 154. Agric. Res. Inst. Pusa. 1924. Calcutta: Govt. of India Central Publication Branch. [Price As. 2.]

VELU. Immunisation du mouton et du bœuf contre le charbon bactéridien par intradermo-vaccination.—*Maroc.-Méd.* 1924. May 15. No. 29. pp. 159–161. With 1 fig.

WATSON (E. A.) & HEATH (L. M.). Studies of Biological Preparations by Complement-Fixation Methods. II. Tuberculin: A New Method of Standardization.—*Jl. Amer. Vet. Med. Assoc.* 1924. Oct. Vol. 66. N.S. 19. No. 1. 12 pp.

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.

BOOKS AND REPORTS RECEIVED.

PFEILER (W.). Die Krankheiten des Schweines unter besonderer Berücksichtigung der Seuchen.—Appendix to Lehrbuch der Schweinezucht von Dettweiler, Müller, Pfeiler. pp. 655–904. With figs. 319–381. 1924. Berlin: Verlag Paul Parey.

VELU (Henri). [Chef du Laboratoire de Recherches du Service de l'Elevage du Maroc] & BAROTTE (Jean) [du Laboratoire de Recherches des T. O. M. à Casablanca]. Éléments pratiques de pathologie vétérinaire exotique. Applications du Laboratoire en médecine vétérinaire.—pp. iii+435. With 21 text figs. 1924. Paris: Emile Larose, Libraire-Editeur, 11, rue Victor Cousin.

BOOKS AND REPORTS RECEIVED—*Continued.*

BRITISH GUIANA. Report on the Department of Science and Agriculture for the Year 1922. [FRANCIS (W.), Acting Director of Science & Agriculture.]—46 pp. 1924. Georgetown, Demerara: "The Argosy" Company, Ltd., Govt. Printers.

INDIA. ASSAM. Report of the Civil Veterinary Department, Assam, for the Year 1923-24. [HARRIS (W.), Supt., Civil Vet. Dept.]—15 pp. 1924. Shillong: Printed at the Assam Secretariat Printing Office. [Price 8 annas. 9 pence.]

——: BURMA. Annual Report of Supt., Stock Breeding, Burma from December 1922 to June 30th, 1923. [IDLE (J. B. Birkenshaw)]—4 pp. 1924. Rangoon: Supt., Govt. Printing. [Price As. 4.]

——. UNITED PROVINCES. Annual Report on the Civil Veterinary Department, United Provinces, for the Year ending 31st March, 1923. [HICKEY (S. G. M.), Offig. Veterinary Adviser to Govt.]—pp. ii+21. With 1 folding map. 1923. Allahabad: Supt., Govt. Press. [Price Re. 1-2-0.]

UGANDA PROTECTORATE. Annual Report of the Department of Agriculture for the Year ended 31st December, 1922. [SIMPSON (S.), Director of Agriculture.]—49 pp. 1924. Entebbe: Govt. Printer.

——. Annual Report of the Department of Agriculture for the Year ended 31st December, 1923. [HEWETT (L.), Acting Director of Agriculture.]—42 pp. 1924. Entebbe: Govt. Printer.

——. Annual Report of the Veterinary Department for the Year ended 31st December, 1923. [HUTCHINS (E.), Chief Vet. Officer.]—15 pp. 1924. Entebbe: Govt. Printer.

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