ing. However, if vigorous, living specimens are needed for experimental purposes, set up the funnels in the morning and draw off the nematodes every hour or two.

Do not use cheesecloth in the funnels. Just as many nematodes will burrow through a more closely woven fabric and far less debris will go through. In cool weather fill the funnels with water heated to a temperature of about 90° F.

For sandy soils, one-pint samples are a convenient and satisfactory size. Clay soils are much more difficult to sieve but the difficulties are not insurmountable. When working with such soils it may be necessary to modify the sieving procedure somewhat and to use smaller samples of soil, or to divide a sample and sieve each part separately.

Standard sieves, as fine as 200 meshes to the inch, can be purchased from companies that sell laboratory supplies. Very satisfactory sieves can be made by cutting the bottoms from tin pans and soldering on copper screening. The sides of such sieves should be painted with asphalt varnish or some similar waterproof paint. Square sieves made in this way are very convenient because the material caught in them can be poured from a corner. Fine sieves should always be thoroughly washed and dried immediately after using.

Attempts to Transfer *Plasmodium berghei* Vincke and Lips to Domesticated Animals[1]

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INTRODUCTION

Plasmodium berghei was first described in 1948 by Vincke and Lips from the red blood cells of a wild tree rat, *Thomnomys surdaster*, in the vicinity of Elisabethville, Belgian Congo. Vincke and Lips were able to transfer the parasites by blood inoculations to *Rattus rattus*, *R. frugivorus*, *R. rattus alexandrinus*, and white mice. They were unable to transfer the organism to guinea pigs and rabbits. Adler and associates (1950), working with *P. berghei* at the Hebrew University in Jerusalem, found this organism infective for the golden hamster, *Mesocricetus auratus*, and the field vole, *Microtus guntheri*.

According to Vincke and Lips, the insect vector is probably *Anopheles dureni* Edw., a mosquito native to the area in which the parasitized rats were captured. This mosquito is very difficult to raise in the laboratory, and so far as the present writer is aware passages through the mosquito to rats have not been successful.

Since *P. berghei* can easily be maintained in laboratory rats it is particularly useful for the testing of antimalarial drugs. For this reason the Division of Tropical Medicine, National Institutes of Health, requested the Bureau of Animal Industry, U. S. Department of Agriculture, for permission to bring this organism into the United States. This Bureau is charged by law with supervision over the introduction of disease organisms into the United States and their distribution within this country after introduction. Permission to do so was granted. When this became known, other research organizations interested in the study of malarial organisms and the chemotherapy of malaria, requested that *P. berghei* be placed at their disposal. Before acceding to these requests, the Division of Tropical Diseases,

[1] The writer wishes to express his thanks to Miss Nancy Allen, formerly of the Division of Tropical Diseases, National Institutes of Health, for her assistance in carrying out the work reported in this paper.

National Institutes of Health, consulted the Bureau of Animal Industry. The Bureau, charged with protecting the livestock industry from diseases and disease-producing organisms not present in the United States, and mindful of the disastrous results that on previous occasions have followed the introduction into this country of foreign pests and their later dissemination, accidental or otherwise, hesitated to grant permission for the distribution of *P. berghei* to laboratories other than those of the National Institutes of Health. It was pointed out that there was no information available on the susceptibility of domestic animals to *P. berghei,* even though it was recognized that the various species of *Plasmodium* are, generally speaking, rather definitely host specific. It was decided that such information should be obtained concerning the possible transmission of *P. berghei* to domestic animals before permission for the distribution of the organism to research laboratories could be granted. In accordance with that decision the experiments described in this paper were carried out.

EXPERIMENTAL PROCEDURE AND RESULTS

The parasitized blood used in these experiments was obtained from white rats, *Rattus rattus.* Each rat was inoculated intravenously (i.v.) with about 5,000 parasites. On the sixth day after inoculation the rats were bled out and destroyed. Blood smears were made and checked for parasites. This heavily parasitized blood was used to inoculate experimental animals.

Two young lambs were each inoculated i.v. with 4 cc of blood from the aforementioned white rats. One young pig was inoculated i.v. with 5 cc of blood and another was given 1.5 cc of blood subcutaneously and 3 cc intraperitoneally. Temperature readings were taken on all inoculated animals beginning on the 4th day after inoculation and continuing through the 20th post-inoculation (P.I.) day. Thick and thin smears of peripheral blood were taken every other day, beginning on the 4th day and continuing through the 20th day, and then every 4th day until the 41st day. All blood smears were negative for parasites.

In order to determine whether any inapparent or subpatent infection was present in the lambs or pigs, blood was drawn on the 20th P.I. day and on the 41st P.I. day and injected i.v. into four young white rats. Two rats were injected with blood from each animal, each rat receiving 0.2 cc of blood. All the rat recipients were observed for 3 weeks following the subinoculations. Blood smears were examined daily for parasites, and at no time did they show any evidence of infection with *P. berghei.*

A similar procedure was carried out using a calf and 2 young goats. The amount of blood used for the initial inoculation varied somewhat from that used in the first group of animals. The calf was inoculated i.v. with 6 cc of heavily parasitized rat blood. The first goat received 6.5 cc and the second received 9.5 cc of rat blood i.v. The first subinoculation into white rats from these test animals was made on the 21st P.I. day. The second subinoculation was made on the 35th P.I. day. No evidence of infection was noted in the rats. Observations on the calf and 2 goats were discontinued on the 35th P.I. day. At no time during the experiment did any of the test animals show signs of infection with *P. berghei,* as determined by repeated examinations of blood smears.

A third group of animals, consisting of 2 puppies and 2 kittens, was inoculated with heavily infected rat blood. One puppy was inoculated i.v. with 2 cc of heavily parasitized rat blood and the second puppy was inoculated i.v. with 4 cc of heavily parasitized rat blood. The same procedure of subinoculation was used on all test animals, except that in this group the first subinoculation was made into white mice on the 6th P.I. day. The second subinoculation was made into

white rats on the 25th P.I. day. The only exception was in the case of the second puppy. That animal showed symptoms of distemper soon after the inoculation of rat blood; therefore, the first subinoculation was made on the 3rd P.I. day. The puppy died of distemper on the 8th P.I. day. At no time did any of the animals in this group show evidence of infection with *P. berghei.* All the subinoculated rats and mice were negative for parasites. Observations on the first puppy were discontinued on the 31st P.I. day and on the kittens on the 35th P.I. day.

The last group of animals used consisted of 5 ten-day-old chicks. Each bird was inoculated i.v. with 0.1 cc of heavily parasitized rat blood. These animals were observed for 32 P.I. days without evidence of *P. berghei* infection, as determined by daily examination of blood smears.

SUMMARY AND CONCLUSIONS

A group of domestic animals, consisting of 2 lambs, 2 pigs, 1 calf, 2 puppies, 2 kittens and 5 chicks, was inoculated i.v. with blood of white rats heavily parasitized with *P. berghei.* The inoculated animals were observed for clinical symptoms of parasitosis with negative results. Thick and thin blood smears were made and found negative for parasites. Subinoculations were made to check for any inapparent or subpatent infections; all results were negative.

Since attempts to transfer *Plasmodium berghei* to the animals used in these experiments were unsuccessful, it is reasonable to conclude that the hosts listed were not susceptible to infection with this parasite.

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Observations on the Length of Dormancy in Certain Plant Infecting Nematodes

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Nematode-infected plant materials collected at various times have been kept at room temperatures at the Salt Lake City, Utah, station of the Division of Nematology to determine the length of dormancy of the nematodes. Corder [1933, J. Parasitol. **20** (2) 1: 104] and McBeth [1937, Proc. Helminth. Soc. of Washington **4** (2): 53] published reports on this material, and the present examination, made in the fall of 1949, constitutes the third report. The reader is referred to Corder (*loc. cit.*) for samples discarded. Samples no. 19–32 are new.

A small portion of each lot of material was soaked in unchlorinated water over night. The nematodes were then picked out and placed on a slide in a drop of water containing a few sand grains, and retained in a moist chamber for several days. The specimens were observed for movement and those showing no activity were taken from the moist chamber and placed on a celluloid slide. When cut with an eye knife the body contents gushed from live nematodes as if they were under pressure, while those of dead specimens oozed only slightly, if at all. Many specimens which did not become active in the moist chamber were found