epidemic, and in this outbreak of the fifteen cases just mentioned who were presumably infected by the milk, nine were children. Five cases occurred in each of two households consisting of six and seven persons respectively. In each case the father escaped and in one case one of the children was also fortunate enough to avoid infection. The explosive nature of the outbreak and its distribution in a limited area are characteristic of a milk-borne epidemic.

As soon as the nature of the disease was recognised, active steps were taken by the local authority, the boot factory and the local medical practitioner to deal with it. The distribution of the milk was stopped and the kraal was destroyed and disinfected by burning. Nursing assistance was obtained. T.A.B. vaccine was freely used, milk and water supplies were all boiled and careful attention was paid to the disposal of excreta.

After the acute flare-up of what may be termed primary milk-borne cases, although they were, of course, secondary to the first three cases, there was an interval of about eight days during which no further cases occurred. Secondary cases who had not used the infected milk and who had another source of water-supply then began to make their appearance and during the next twelve days four such cases occurred. Two of these were in semi-detached houses adjacent to one of the households which had been most seriously affected, whilst the other two occurred in a house a short distance away. These cases were presumably infected either by flies or by direct contact.

It is interesting to note that the medical practitioner in charge of the outbreak reported that all those cases who had had prophylactic doses of T.A.B. had comparatively mild attacks. Of the seven earlier cases who had not had vaccine, two died and one had a haemorrhage.

The measures which had been introduced to control the outbreak were adequate and the disease did not spread any further. This outbreak is of importance as indicating the horrors and dangers of milk-supplies which are not under proper control. The conditions were ideal for the spread of the disease. The woman nursed the boys who were suffering from typhoid; at the same time she disposed of their excreta in the kraal where she herself milked the cows.

The fact that outbreaks such as this can still occur in rural areas in this enlightened age is an interesting commentary on the state of our milk production in country districts. Yet it must be emphasised that the conditions in this case were by no means unique. There are undoubtedly many places where similar conditions of milk production prevail and which would be exposed to the same dangers if specific infection reached the milk. There is a great need for more careful hygiene in dairying, particularly in country districts. It was extremely fortunate that in this case the cows were not more productive nor the customers more numerous!

Harpactirella Lightfooti as a Cause of Spider-Bite in the Union.*

By M. H. Finlayson, B.Sc., M.B., Ch.B., D.P.H. (Union Health Department, Cape Town).

With a NOTE ON THE BIOLOGY OF HARPACTIRELLA LIGHTFOOTI (PURCELL).

By R. Smithers, B.Sc. (South African Museum, Cape Town).

IN 1935 an investigation was carried out to determine the spider involved in cases of "knopie-spider" bite. In a preliminary publication (Finlayson, 1936) it was shown that L. indistinctus and L. concinnus (L. geometricus) were the spiders chiefly concerned in cases of "knopie-spider" bite in the Union.

During the course of the investigation, reference was made to "tarantula" bites, and various observers stated that "tarantulas" inflicted bites which produced severe illness. Specimens of so-called tarantulas were obtained and were found to belong to the genus Harpactira. On investigation it was found that the bite of these spiders produced no symptoms in such experimental animals as white mice and guinea-pigs. Further investigation of "tarantula" bite was therefore discontinued.

In July, 1939, Mr. Smithers of the S.A. Museum, Cape Town, informed me that two cases of "tarantula" bite had occurred on Jutten Island (Saldanha Bay). The spider which was considered the causal agent was Harpactirella lightfooti. No evidence, other than the statement of the victims, was available to show that this spider was capable of inflicting lesions in man.

The following notes on the cases were obtained through the courtesy of Dr. Allan, Deputy Chief Health Officer, Cape Town, from Dr. Rauch, District Surgeon of Vredenburg, and from Mr. Hewitt, Superintendent of the Guano Islands, who also kindly supplied specimens of spiders:

Case 1.—Was bitten on the right hand. Immediately after attack, a burning pain was experienced in the region of the bite. A tourniquet was applied, and after a latent period of two hours, patient vomited continuously and showed marked signs of shock. Patient was pale and collapsed and unable to walk. No discoloration or swelling was visible at the site of the bite. The patient was treated with morphine and adrenaline and appeared normal 24 hours after the bite.

Case 2.—In this case the symptoms were identical with those described in Case 1 but were less marked. Treatment by application of tourniquet and injections of morphine and adrenaline proved equally effective.

Experimental.

A female H. lightfooti was placed on the flank of a 25 gm. white mouse. The spider immediately buried its fangs in the animal and was removed 60 seconds after biting. For a few seconds the mouse

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showed no symptoms, but rapidly developed convulsions, and two and a half minutes after the bite collapsed and died.

A second spider was placed on the flank of a 25 grm. white mouse. Again the spider was removed after biting for a period of 60 seconds. A few minutes after the bite the mouse developed symptoms of hyperexcitability and nervous irritation. Within five minutes after the bite the mouse was convulsed. Convulsions continued at short intervals and 30 minutes after the bite the mouse died.

A third spider was allowed to bite a 300 grm. guinea-pig on the ear for 30 seconds. Five minutes after the bite the guinea-pig showed symptoms of respiratory embarrassment and hyperaesthesia. Five minutes later it was noted that the animal was unable to retract its limbs when the limbs were extended. Opisthotonos was also observed. Forty minutes after the bite the animal attempted to vomit and showed marked symptoms of respiratory embarrassment. A few convulsions were noted at this stage. The symptoms gradually decreased in severity and three hours after the bite the guinea-pig appeared to have recovered.

An attempt was made to separate the venom from the spider by the method described by Finlayson (1936). The venom sacs are contained in the chelicerae, and the chelicerae from 18 spiders, dissected by Mr. Smithers, were ground up with distilled water. The resultant product was dried at o°C over P₂O₅ and redissolved in water before injection into animals.

Mice were inoculated intravenously with gradually increasing doses of the venom preparation, and it was found that a dose of even 5.0 mgm. produced only slight nervous symptoms. It was therefore clear that the venom was extremely labile and was destroyed by the process of extraction.

In view of the difficulty in obtaining supplies of pure venom, no quantitative experiments to determine the neutralising action, if any, of L. indistinctus antivenene on H. lightfooti venom could be carried out. An attempt was made, however, to determine whether or not L. indistinctus antivenene protected animals against the bite of H. lightfooti.

Two white mice, each weighing 25 grams, were subjected to the bite of H. lightfooti, and after 60 seconds the spider was removed. Prior to the bite each mouse was injected intravenously with 0.2 c.c. of a 1 in 2 dilution of L. indistinctus antivenene, as used for issue for treatment of cases of "knoopie-spider" bite.

Both mice showed definite symptoms of hyperexcitability and irritation. These symptoms lasted for about an hour and gradually decreased in severity. Two hours after the bite the mice showed no symptoms. Both mice survived.

**Discussion.**

Two cases of the bite of H. lightfooti have been described. The symptoms of the bite of this spider are similar to those described as occurring following the bite of the South American Mygale, or Paciloc-thira (Simon, 1885).

Vellard (1936), describing the action of certain neurotropic spider venoms including the venom of the Mygale, to which the Harpactirella are related, states: "They provoke a period of initial excitation much more violent than the venom of Latrodectus, a greater depression and hyperaesthesia, considerable exaggeration of the reflexes and more marked cramps; as the degree of envenomation proceeds, the convulsions, at first local, become general: the animals are entirely paralysed, rigid in opisthotonos, the neck retracted upwards, the limbs in forced extension. This state is interrupted by frequent convulsions. Death occurs from asphyxia, during a convulsion." This description aptly describes the action of the venom of H. lightfooti on animals such as mice and guinea-pigs.

The failure to separate the spider venom by the methods which proved successful in the case of the venom of L. indistinctus illustrates the extreme lability of the venom of H. lightfooti. In this respect the venom resembles that of certain South American spiders which, according to Vellard (1936), becomes inactive at room temperature within a few days. In the course of the attempts to separate the venom, described above, the venom was dried over a period of four to five days, and it would appear that it lost almost all its activity during this time.

It is of interest to note that, although it was not possible for quantitative tests to be carried out, the antivenene prepared against L. indistinctus venom appeared to confer some protection in experimental animals against the bite of H. lightfooti. It is suggested that this antivenene be used in treatment of cases of bite by this spider, although it is not yet clear whether its protective action is the result of the presence of any specific antibodies acting against antigens present in H. lightfooti venom.

Records of human cases of spider-bite caused by H. lightfooti in the Union are rare. It would not appear that the venomous characters of this spider are as marked as those of L. indistinctus, the "knoopie-spider", which causes the majority of cases of spider-bite reported in the Union.

**Summary.**

(1) Two cases of spider-bite caused by H. lightfooti are reported.

(2) The bite of specimens of H. lightfooti was found to be lethal to white mice.

(3) Attempts to separate the venom of H. lightfooti were unsuccessful in view of the lability of the venom.

(4) Mice injected with L. indistinctus antivenene were found to be protected against the bite of H. lightfooti.

I have gratefully to acknowledge the supply of spiders and dissected chelicerae by Mr. Smithers and the supply of spiders by Mr. Hewitt, also the technical assistance of Mr. G. M. Grobler in carrying out the experiments detailed above.