(4) Inactivated extract confers little or no protection. The strain of virus used for testing the pigs on their immunity after treatment with inactivated extract would appear to be responsible for the small percentage which survive an immunity test with virulent blood.

As a result of the experimental immunization work, a number of recovered pigs are now available for hyperimmunizing with a view to the production of an anti-serum, and work in this direction is being continued.

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**Paper No. 33.**

**RABIES IN SOUTH AFRICA.**

By P. J. du Toit, B.A., Ph.D., Dr. Med. Vet., Director of Veterinary Services and Animal Industry, Department of Agriculture, Union of South Africa.

For many years the Union of South Africa has been considered free of rabies.

1. **Port Elizabeth Outbreak, 1893.**

The last authentic outbreak to occur was at Port Elizabeth in 1893. The disease had been introduced into the country with an Airedale terrier which was landed at Port Elizabeth in September, 1892. This dog took ill soon after arrival and exhibited symptoms which were very suspicious of rabies: "he first became unaccountably savage, attacked and fought with every dog he met, and barked and howled incessantly for a day or two before he died." The next case was observed in January, 1893, and this was followed by numerous cases until the disease was diagnosed by the local Government Veterinary Officer Britton in April, 1893.

The diagnosis was confirmed by subincision into rabbits by Edington and Hutcheon at the Laboratory in Grahamstown.

Steps were immediately taken to deal with the outbreak. A Rabies Act was passed by Parliament and regulations were issued which prescribed the measures to be enforced. In Port Elizabeth all dogs had to be muzzled and tied up. Stray dogs were to be destroyed; and in less than a year about 2,000 had been dealt with in this way.

The disease also spread to the surrounding districts of Uitenhage, Jansenville, Willowmore and Albany, and in these areas also large numbers of ownerless dogs were destroyed.

The measures adopted were entirely successful and a year after the first outbreak the disease had disappeared completely. No mention is made of rabies in the subsequent annual reports of the Colonial Veterinary Surgeon, and at no time since 1893 has the disease again made its appearance in dogs in the Union of South Africa.

Before leaving this outbreak the following significant statement which occurs in the Annual Report for the year 1893 of Colonial Veterinary Surgeon, Dr. Hutcheon, may be quoted: "I was in great dread at one time when the disease seemed absent from the Union, the exception of the cattle which were eaten by wild hares near Van Staden, and feared the possibility of our ever witnessing another outbreak."

2. **Rabies in Southern Rhodesia.**

In Southern Rhodesia a case in August, 1902, in the neighbouring country spread rapidly and preventive measures were taken with success. In about six months nearly 40,000 dogs were killed and a report for the year 1902/1903 to the Union of South Africa states: "the disease was pretty well stamped out with a muzzling regulation."

The following year the situation further improved; about 60,000 dogs were killed and in 1904 and 1905 very few cases were reported. The disease then fluctuated for the next few years, with a marked reduction in the number of cases reported in 1912. The position again became worse in 1913/1914, but improved considerably after 1914/1915.

One incident which is mentioned in the report for the year 1914 is of particular interest. During the night, a farmer awoke to find a dog on his doorstep. He went outside and tied the dog on a chain. The dog behaved in a most friendly manner and seemed to recognize its master. The next day the dog was found dead and the presence of Rabies was confirmed by laboratory tests.

From these accounts it would appear that Africa has been free of rabies for the last 15 years and no cases have been reported.

In both outbreaks described above (Southern Rhodesia 1902-1913) there was a complete disappearance of the disease, the fear was expressed that wild fauna (carnivores) and so be controlled by the country.

Recent events have tended to demonstrate this possibility.
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surrounding districts of Uitenhage, Port Elizabeth, and in these areas also large flocks were destroyed.

irely successful and a year after it disappeared completely. No subsequent annual reports of the disease have occurred since 1893 and the disease was not reported in dogs in the Union of South Africa for several years. As a result, the Union of South Africa has been declared free from rabies for about 35 years, and that during the last 15 years no cases have been reported south of the Zambesi.

In both outbreaks described above (Port Elizabeth, 1899, and southern Rhodesia, 1902-1913) there was a considerable spread and then a complete disappearance of the disease. In both cases, however, the fear was expressed that the disease might spread to the wild fauna (carnivores), and so become permanently established in the country.

Recent events have tended to confirm these fears.

Since 1916 a number of cases (more than a dozen) have occurred in human beings, in which the symptoms were typical of rabies. These cases were fully described by Cluver (1927) who found that in the majority of cases the persons had been bitten either by a yellow mongoose ("rooi meerkat," Cynictis penicillata) or by a genet cat ("muskaajakat," Genetta felina). A few persons had been bitten by dogs.

In none of the cases mentioned by Cluver could the diagnosis of rabies be confirmed by the demonstration of Negri bodies or the successful inoculation of rabbits. In some cases the material which was submitted for these examinations was too decomposed, and in others no material was submitted at all.

There was, therefore, room for serious doubt whether those cases had been true cases of rabies. From the medical point of view the suspicion that they were rabies seemed very strong; the symptoms in the human patients were so typical of the disease that it was almost impossible to doubt the diagnosis. But from the veterinary point of view the position was not so clear. The chief argument against the assumption that it was rabies, was the consideration that rabies is a disease that cannot be hidden. If rabies had been present in the Union for all these years, why did it not spread among the dog population and cause much greater damage than was actually the case?

It should be remembered that in two of the cases enumerated by Cluver (1927) the infection was actually ascribed to the bite of a dog.

Doubt in regard to the nature of the disease persisted in the minds of the veterinary authorities until the latter end of 1928 when two further cases occurred in the Wolmaransstad district of the Transvaal under the following circumstances.


On the 30th October, 1928, some children on their way to school caught a "meercat" (yellow mongoose) on the farm Syfrynget 44, in the Wolmaransstad district. The meercat, which was obviously ill, was driven into a shallow hole, and in catching it, one of the children was bitten in the finger. Later in the morning while the children were playing with the meercat another boy was bitten in the finger. The meercat was then killed by the other children and the body thrown away.

Both boys began showing symptoms on the 17th November, i.e. 19 days after the bite. The one died on the 20th November and the other on the 23rd, after having shown all the classical symptoms of hydrophobia, as described in the textbooks. An excellent account of these cases was given by the local physician, Dr. Herzenberg.

A post-mortem examination was made in both cases. The brains were removed and portions sent to the Medical Research Institute, Johannesburg, while the other portions were sent to the Veterinary Research Laboratories, Onderstepoort, Pretoria. A microscopic examination of the brain material was carried out at the latter Institute by Dr. de Kock, who succeeded in demonstrating typical Negri bodies.

The material was also injected and typical cases of rabies were put up to Mr. I. P. Marais, on the transmission experiments.

The diagnosis was also confirmed by Institute, Johannesburg.

Here then, for the first time diagnosed in the Union with absolute clear indication that infection had a yellow mongoose.

The positive result obtained by Mr. Marais was correct, viz., that those persons with rabies through the bite of a yellow mongoose.

5. The Disease Amongst Yellow Mongooses

It should be explained here that the very alert and nimble little animal is never therefore, it is caught with a file to be reason to suspect that it is not one of the instances mentioned by 21 years of age, gave chase to a wandering aimlessly.” The animal was then driven into a shallow hole and left. The animal bit the child, and the child developed symptoms of rabies and died.

In the case of the two boys mentioned above, it was also found that the mongoose which inflicted the bite was the brother of one of the boys said the looking. He stated that it would kill children to have caught a healthy mongoose.

Other farmers in the surrounding area made by the local Government Veterinary Services, Mr. Goodall, who visited the two boys. Many farmers stated that the mongoose which wandered aimlessly about about 1 Mr. Goodall that he had often seen out of the way but could easily approach human beings, but may even adopt a threatening posture.

Similar evidence was obtained by the veterinarians. Many cases had been reported of the mongoose taking up such a meercat. Event was caught by the police on the farm where the two boys had been bitten. In this meercat the Police reported that...
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The material was also injected into rabbits and other animals and typical cases of rabies were produced. This portion of the work was entrusted to Mr. J. F. Marais, who will publish a detailed report on the transmission experiments in due course.

The diagnosis was also confirmed at the Medical Research Institute, Johannesburg.

Here then, for the first time since 1893, rabies had been diagnosed in the Union with absolute certainty, and there was a clear indication that infection had come about through the bite of a yellow mongoose.

The positive result obtained in this case makes it extremely probable that the explanation offered by Cluver for some of his cases was correct, viz., that those persons had actually become infected with rabies through the bite of a yellow mongoose.

5. The Disease amongst Yellow Mongoose (\textit{Cynictis penicillata}).

It should be explained here that the mongoose is ordinarily a very alert and nimble little animal which is not easily caught. When therefore, it is caught with comparative ease there would seem to be reason to suspect that it is not healthy. Such was the case in some of the instances mentioned by Cluver. In one case a student, 21 years of age, gave chase to a yellow mongoose "which was wandering aimlessly." The animal was caught and bit its captor viciously in the finger. Eight weeks later the student developed typical symptoms of rabies and died. In another case a yellow mongoose "was found ill in a hole" and was caught by a boy of 7 years. The animal bit the child in the hand. Six weeks later he developed symptoms of rabies and died.

In the case of the two boys in the Wolmaraanstad district, mentioned above, it was also found on subsequent investigation that the mongoose which inflicted the bites, was probably ill. An elder brother of one of the boys said that the animal was thin and sick looking. He stated that it would have been impossible for the children to have caught a healthy meecrat.

Other farmers in the neighbourhood stated, in reply to enquiries made by the local Government Veterinary Officer, Mr. Lund, that they had at various times seen thin meecrats on the veld which appeared to be sick and mad. These sick animals do not run away when approached by human beings, as healthy meecrats would do, but may even adopt a threatening attitude.

Similar evidence was obtained by the Sub-Director of Veterinary Services, Mr. Goodall, who visited the area soon after the death of the two boys. Many farmers stated that they had seen these thin meecrats wandering aimlessly about the veld. A taxidriver informed Mr. Goodall that he had often seen such animals which would not get out of the way but would easily be run over.

A reward was offered for anyone catching and sending to the Laboratory such a meecrat. Eventually in April, 1929, a meecrat was caught by the police on the farm Syfersagt 44, the same farm where the two boys had been bitten in October, 1928. In forwarding this meecrat the Police reported that the animal was obviously
suffering from some disease as it was wandering about in an aimless manner. Unfortunately the meercat died before it reached Onderstepoort, but the brain was removed and both by microscopical examination and by animal inoculation could the diagnosis of rabies be confirmed.

Another interesting case was reported from Dealesville, in the Orange Free State. A resident of this village reported that, while standing at his kitchen door one afternoon about 5 o'clock he saw his dog running away from something. He then noticed a meercat (yellow mongoose) coming towards the house and taking up a threatening attitude towards one of his children. The child ran away and the father killed the meercat which seemed ready to attack him. The lower jaw of the meercat was found to be wet, as if there had been profuse salivation. The dog was subsequently examined and found to have teeth marks on his lips, and a son of the man stated that he had seen the dog fighting with the meercat and then running away.

The head of the mongoose was sent to Onderstepoort and Negri bodies were demonstrated in the brain. The dog was also sent to the Laboratory and will be kept under observation. Up to the time of writing (3 weeks after the incident) the animal appeared to be normal.

We have thus proved finally that rabies is actually present amongst wild meercats on the veld.

6. The Dealesville Cases.

A. Rabies in a Dog, February, 1929.

A very interesting case occurred on the farm Blandford (Boshof district) about 16 miles from Dealesville in the Free State. The farmer on returning home was informed that one of his dogs, a bulldog pup, about 8 months old, had suddenly attacked and killed two cats and a number of fowls. Upon inspection the farmer found the dog viciously attacking another dog. He tried to separate the animals, but the bulldog jumped at him and bit him in the hand. The dog then ran away and attacked everything he met: cattle, pigs, fowls, geese, etc. Later on the dog was caught and tied up, but escaped again and attacked more animals. Before it could be secured once more it bit a native in the face. (This native subsequently died of rabies.) The dog was then put in a box and despatched for examination, but died the same night. Its brain was examined and rabies was diagnosed both by microscopical examination and by inoculation of rabbits and guinea pigs.

Subsequent investigations elicited the following interesting story from the owner of the dog: About a month before the incidents just referred to, both dogs were seen "fighting" with a yellow mongoose which they had chased into a stone cave. The farmer could not say whether the animals were actually bitten, but he considered it very likely as the mongoose was at bay in the cave and appeared to be very vicious. The dogs did not kill the meercat, which eventually escaped. In considering this occurrence it should be borne in mind that the bulldog was only a puppy likely to be bitten than its older siblings.

In view of this observation an investigation was made to determine if the case could also be traced to ainfected meercats. The farmer was treated with the responsible meercat, which was fed to a dog. The dog bit the meercat, which in turn showed signs of rabies.

In order to complete the above observations the farmer was treated with a live meercat, and the other animals on the farm which had been kept in quarantine. One pig was diagnosed by a local veterinarian as having rabies and was slaughtered.

B. Rabies in an Ox.

On the farm Witkom, which is near Blandford, in the Dealesville district, an ox was killed on the 11th of July. From a distance he observed the ox jumping and re-forming the head down as if being attacked by a meercat (yellow mongoose) in the head down as a peculiar noise. The meercat was caught and brought to the laboratory. Upon examination it was found that the ox was charred.

Nineteen days later one of the heifers began to show peculiar symptoms. It was noticed that the cow had saliva running from the mouth, but the animal was otherwise perfectly healthy. The farmer suspected that the animal had rabies and was killed and buried.

The next day the head was examined. Other cattle were attacked, fences were broken down and the animal ran over in one such attempt and tore its skin with its horns. The farmer then also the farmer. He was examined by the following day by a veterinary surgeon, Mr. Cannon, from whom the ox fell over in one such attempt and tore its skin with its horns. The animal then also the farmer. He was examined by the following day by a veterinary surgeon, Mr. Cannon, from whom the ox fell over in one such attempt and tore its skin with its horns. The animal was partially paralysed. Watery eyes. The animal yawned frequently and looked at the meat offered green food to pick up some, but could not chew it.

The ox was then killed and the head examined. Microscopical examination showed rabies in the brain of rabbits which were inoculated with the brain material.

Although it could not be proved by the examination of the brain that this case was rabies, the facts recorded indicate that in this case too the infection was from a yellow mongoose.
was wandering about in an aimless
that the bulldog was only a puppy of 8 months, and was far more
tendency of rabies being present.

In view of this observation and the fact that the farm in question
literally swarms with meercats, it seems very likely that the infection in
this case should also be traced to a yellow mongoose.

In order to complete the above account, it should be mentioned
here that the farmer was treated with anti-rabid vaccine and remained
healthy. The second dog which was bitten by the rabid animal was
sent to Onderstepoort for examination; up to the time of writing
(about 4 months after being bitten) no symptoms had developed. The
other animals on the farm which had been attacked by the dog were
kept in quarantine. One pig became ill and "dumb rabies" was
diagnosed by a local veterinarian. The other pigs were thereupon
slaughtered.

B. Rabies in an Ox, June, 1929.

On the farm Witdam, which is situated about 10 miles from the
farm Blandford, in the Dealesville district, the owner proceeded on
horseback to the veld, on the 11th May, to inspect his animals.
From a distance he observed the oxen standing in a circle and then
jumping away and re-forming the circle. On coming nearer he saw
a meercat (yellow mongoose) in the middle of the circle with its
head down making a peculiar noise. The cattle would approach the
meercat out of curiosity and smell at it, when the meercat would
snap at them and then return to its original position. When the
farmer approached, the meercat seemed inclined to attack him, but
it was killed and buried.

Nineteen days later one of the oxen which had formed the circle
began to show peculiar symptoms. The animal bellowed continually
with saliva running from the mouth and tongue protruding. The
farmer suspected a bone in the animal's throat and tried to catch it,
but the animal (which was formerly very tame) assumed a threaten-
ing attitude. When it was caught it immediately lay down, but as
soon as it was released it proceeded to push down fences and other
objects. The ox was driven to the veld and there chased other
animals. The next day the aggressive symptoms had increased.
Other cattle were attacked, fences were pushed over, and when the
ox fell over in one such attempt it proceeded to bite at its own side
and tore its skin with its horn. The ox got up again and chased a
horse and then also the farmer. Finally the animal was tied up and
when examined the following day by the local Government Veterinarian
Officer, Mr. Canham (from whom the above facts were obtained), it
was partially paralyzed. Watery liquid dropped from mouth and
eyes. The animal yawned frequently and the eyes had a staring
look. On being offered green food the ox had the greatest difficulty
to pick up some, but could not chew it and dropped it again.

The ox was then killed and the brain removed for examination.
Microscopical examination showed numerous Negri bodies and the
rabbits which were inoculated developed typical symptoms of rabies.

Although it could not be proved that the ox had been bitten by
the meercat, the facts recorded above make it extremely likely
that in this case too the infection was brought about by the bite of
a yellow mongoose.