

## RESULTS.

Of four animals injected intrajugularly with material taken from heifer 1155 (which was killed twenty-six days after infestation of ticks, or fifteen days after the first rise of temperature), two contracted East Coast fever and died from the inoculation. The remaining two showed irregular reactions, and when exposed to veld infection, one died of tick irritation, and the other was still alive at the date of writing.

This survivor had been injected intrajugularly with 10 c.c. spleen and gland pulp (coarse grain).

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 EXPERIMENT No. 12.

## TO NOTE THE EFFECT OF THE INJECTION OF MATERIAL OBTAINED FROM HEIFER 1158.

NOTE.—Heifer 1158 was infested on the 23rd January, 1911, with ten brown adults off heifer 1111 (Reference No. 426); all ten ticks were fast the following day. A typical East Coast fever reaction followed from the 11th day, with the remission on the 20th day. *Theileria parva* were detected in the blood for the first time on the 23rd day; plasma bodies were found in the glands on the 16th day.

The animal died of East Coast fever on the 27th day (19th February, 1911), and examination of the glands and spleen showed the presence of plasma bodies; cocci were also seen in the gland smears.

(a) INTRAJUGULAR INJECTIONS *on the 19th February, 1911, with 30 c.c. spleen pulp (coarse grain) of Heifer 1158.*

(A).—*Heifer 1086, about 3 years old, a Cape Province animal, which arrived at the Laboratory in May, 1910.*

NOTE.—This animal had been used previously on one occasion without contracting the disease, namely, on the 3rd January, 1911, for an intrathoracic injection of spleen pulp of ox 179 [*vide* Experiment No. 8 (*w*)].

*Treatment.*—Injected as above.

*Remarks.*—The heifer died on the 2nd day of gangrenous pneumonia.

(B).—*Heifer 904, aged, a Cape Province animal, which arrived at the Laboratory in October, 1909.*

NOTE.—This animal had been used previously on one occasion without contracting the disease, namely, on the 3rd January, 1911, for an intrajugular injection of spleen pulp of ox 179 [*vide* Experiment No. 8 (*w*)].

*Treatment.*—Injected as above.

*Remarks.*—Temperature: Immediate reaction followed, lasting until the 16th day, on which date the animal died, having shown all the symptoms of pneumonia during the reaction. *Post-mortem* examination revealed the presence of a gangrenous pneumonia.

(C).—*Heifer* 889, about three years old, a Cape Province animal, which arrived at the Laboratory in August, 1909.

NOTE.—This animal had been used previously on one occasion without contracting the disease, namely, on the 3rd January, 1911, for an intrajugular injection of spleen pulp of ox 179 [*vide* Experiment No. 8 (b)].

*Treatment.*—Injected as above.

*Remarks.*—An immediate rise of temperature followed, and the heifer was found dead on the 3rd day. *Post-mortem* examination showed the presence of a gangrenous pneumonia.

(b) INTRAJUGULAR INJECTIONS on the 19th February, 1911, with 30 c.c. spleen and gland pulp of *Heifer* 1158.

(D).—*Heifer* 902, about three years old, a Cape Province animal, which arrived at the Laboratory in October, 1909.

NOTE.—This animal had been used previously on one occasion, namely, on the 3rd January, 1911, for an intrajugular injection of spleen pulp of ox 179 (*vide* Experiment No. 8 (m)).

*Treatment.*—Injected as above.

*Remarks.*—The animal died on the 4th day of gangrenous pneumonia.

(E).—*Heifer* 988, about two years old, a Cape Province animal, which arrived at the Laboratory in April, 1910.

NOTE.—This animal had been used previously on one occasion without contracting the disease, namely, on the 3rd January, 1911, for an intrathoracic injection of spleen and pulp of ox 179 [*vide* Experiment No. 8 (t)].

*Treatment.*—Injected as above.

*Remarks.*—Some irregular temperatures followed, and the animal died on the 10th day of gangrenous pneumonia.

## SUMMARY OF EXPERIMENT NO. 12,

With Material from Heifer 1158.

NUMBER OF DAYS WHICH ELAPSED BETWEEN INFESTATION OF ANIMAL WITH TICKS AND DEATH: 27.

NUMBER OF DAYS WHICH ELAPSED BETWEEN THE DATE OF THE FIRST RISE OF TEMPERATURE AND DEATH: 16.

(Cocci were found in the gland smears taken immediately after death.)

DETAILS OF INJECTIONS AND RESULTS.								Result.	REMARKS.
Ref. No.	Animal injected.	No. of times the animal was injected previously or subsequently.	References to these injections.	Method of injection.	Quantity injected.	Material injected.			
						Pulp of	Grain.		
A.	Heifer 1086.....	1	Experiment S W	Intrajugular.....	30 c.c.	Spleen.....	Coarse	† G.P. 2nd day.	
B.	Heifer 904.....	1	Experiment S N	" .....	" .....	" .....	" .....	† G.P. 16th day.	
C.	Heifer 889.....	1	Experiment S L	" .....	" .....	" .....	" .....	† G.P. 3rd day.	
D.	Heifer 902.....	1	Experiment S M	" .....	" .....	" .....	" .....	† G.P. 4th day.	
E.	Heifer 988.....	1	Experiment S T	" .....	" .....	" .....	" .....	† G.P. 10th day.	

### EXPLANATION OF SYMBOLS.

† G.P.—Indicates that the animal died of gangrenous pneumonia.

## RESULTS.

Of five animals injected intrajugularly with 30 c.c. spleen pulp (coarse grain) taken from heifer 1158 (which died twenty-seven days after the infestation of ticks, or sixteen days after the first rise of temperature), all died of gangrenous pneumonia.

(Cocci were found in the smears of heifer 1158 after death.)

## EXPERIMENT No. 13.

TO NOTE THE EFFECT OF THE INJECTION OF MATERIAL OBTAINED FROM HEIFER 668.

NOTE.—Heifer 668 was infested on the 27th January, 1911, with twenty brown nymphae off heifer 909 (Reference No. 373), of which twelve were fast the following day. A typical East Coast fever reaction followed from the 11th day; *Theileria parva* were detected in the blood for the first time on the 18th day. The animal was killed on account of East Coast fever on the 25th day (21st February, 1911), and examination of the glands and spleen showed the presence of plasma bodies.

(a) INTRAJUGULAR INJECTIONS on the 21st February, 1911, with 30 c.c. spleen and gland pulp (coarse grain) of Heifer 668.

(A).—Cow 983, about eleven years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—A slight reaction followed for the first few days: Some irregular temperatures were noted later. On the 25th day the examination of the glands revealed the presence of certain bodies resembling plasma bodies, but no definite diagnosis could be made.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, and was still alive on the 31st August, 1911.

(b) INTRAJUGULAR INJECTIONS on the 21st February, 1911, with 30 c.c. spleen pulp (coarse grain) of Heifer 668.

(B).—Cow 918, aged; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A slight fever reaction noted from the 11th day.

(b) Microscopical examination of blood: Negative. Puncture of the lymphatic glands on the 14th, 20th, 21st, and 25th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 28th April, 1911, and was still alive on the 31st August, 1911.

(C).—Heifer 653, about five years old, a Cape Province animal, which arrived at the Laboratory in August, 1908.

*Treatment.*—Injected as above.

*Remarks.*—A slight fever reaction occurred for the first ten days; no microscopical examinations were undertaken.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, 1911, and was still alive on the 31st August, 1911.

(D).—Cow 954, about seven years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—No definite reaction was noticed and no microscopical examinations were undertaken.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, 1911, and was still alive on the 31st August, 1911.

## SUMMARY OF EXPERIMENT No. 13,

With Material from Heifer 668.

NUMBER OF DAYS WHICH ELAPSED BETWEEN INFESTATION OF ANIMAL WITH TICKS AND DEATH: 25.

NUMBER OF DAYS WHICH ELAPSED BETWEEN THE DATE OF THE FIRST RISE OF TEMPERATURE AND DEATH: 14.

(No bacteria were found in the smears taken immediately after death.)

### DETAILS OF INJECTIONS AND RESULTS.

Ref. No.	Animal injected.	Method of injection.	Quantity injected.	Material injected.		Result.	Result of exposure at Burnside.	REMARKS.
				Pulp of	Grain.			
A.	Cow 983.....	Intrajugular.....	30 c.c.	Spleen and gland.....	Coarse	I.R. (doubtful plasma bodies).	Still alive (127 days).	
B.	Cow 918.....	" .....	"	Spleen.....	"	I.R.	Still alive (127 days).	
C.	Heifer 653.....	" .....	"	" .....	"	I.R.	Still alive (127 days).	
D.	Cow 954.....	" .....	"	" .....	"	N.R.	Still alive (127 days).	

#### EXPLANATION OF SYMBOLS.

I.R.—Indicates that the animal had an irregular reaction and recovered.  
 N.R.—Indicates that the animal did not react to the injection.

## RESULTS.

Of four animals injected intrajugularly with material taken from heifer 668 (which was killed twenty-five days after the infestation of ticks, or fourteen days after the first rise of temperature), irregular reactions were noted in all cases. All were exposed later to veld infection, and were still alive at the date of writing.

## EXPERIMENT No. 14.

TO NOTE THE EFFECT OF THE INJECTION OF MATERIAL TAKEN FROM OX 577.

NOTE.—Ox 577 was infested on the 3rd February, 1911, with twenty brown nymphae off heifer 909 (Reference No. 431), of which nine were fast the following day.

A typical East Coast fever reaction followed from the 10th day, with a remission on the 23rd day. The animal was killed on account of East Coast fever on the 25th day (28th February, 1911), and examination of the spleen showed the presence of plasma bodies.

(a) INTRAJUGULAR INJECTIONS on the 28th February, 1911, with 20 c.c. spleen pulp (coarse grain) of Ox 577, mixed with 10 grammes peptone.

(A).—Cow 624, about four years old, a Cape Province animal, which arrived at the Laboratory in July, 1908.

*Treatment.*—Injected as above.

*Remarks.*—A slight temperature reaction followed, lasting for the first few days. A typical East Coast fever reaction set in from the 15th day; *Theileria parva* were not detected in the blood; plasma bodies were found in the glands on the 18th day.

The animal died of East Coast fever on the 22nd day, and examination of the glands and spleen showed the presence of plasma bodies (agamogonous forms).

(b) INTRAJUGULAR INJECTIONS on the 28th February, 1911, with 30 c.c. spleen pulp (coarse grain) of Ox 577.

(B).—Cow 580, about five years old, a Cape Province animal, which arrived at the Laboratory in June, 1908.

*Treatment.*—Injected as above.

*Remarks.*—A slight reaction was noted for the first few days. A typical East Coast fever reaction followed from the 12th day, with a remission on the 22nd day; *Theileria parva* were detected in the blood for the first time on the 25th day; plasma bodies were found in the glands on the 15th day.

The animal died of East Coast fever on the 34th day, and examination of the glands and spleen showed the presence of plasma bodies.

(C).—Heifer 657, about two and a half years old, born in the Laboratory stables.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A slight disturbance was noted between the 17th and 30th days.

(b) Microscopical examination of the lymphatic glands on the 18th day proved the presence of plasma bodies; they were not found on the 27th day.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, 1911, and was still alive on the 31st August, 1911.

## SUMMARY OF EXPERIMENT NO. 14,

### With Material from Ox 577.

(No bacteria were found in the smears taken immediately after death.)

NUMBER OF DAYS WHICH ELAPSED BETWEEN INFESTATION OF ANIMAL WITH TICKS AND  
DEATH: 25.

NUMBER OF DAYS WHICH ELAPSED BETWEEN THE DATE OF THE FIRST RISE OF TEMPERATURE  
AND DEATH: 15.

#### DETAILS OF INJECTIONS AND RESULTS.

Ref. No.	Animal injected.	Method of injection.	Quantity injected.	Material injected.		Result.	Result of exposure at Burnside.	REMARKS.
				Pulp of	Grain.			
A.	Cow 624.....	Intrajugular.....	20 c.c.	Spleen (and peptone)...	Coarse	R.P. †	—	
B.	Cow 580.....	„ .....	30 c.c.	Spleen.....	„	R.P. †	—	
C.	Heifer 657.....	„ .....	„	„ .....	„	R.P.R.	Still alive (127 days).	

#### EXPLANATION OF SYMBOLS.

R.P. †.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and died of East Coast fever,

R.P.R.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and recovered.

## RESULTS.

Of three animals injected intrajugularly with spleen pulp of ox 577 (which was killed twenty-five days after the infestation of ticks, or fifteen days after the first rise of temperature), three contracted East Coast fever from the injection and two died; this surviving animal was exposed to natural infection, and was still alive at the date of writing.

It had been injected intrajugularly with 30 c.c. spleen pulp (coarse grain).

## EXPERIMENT No. 15.

TO NOTE THE EFFECT OF THE INJECTION OF MATERIAL OBTAINED FROM HEIFER 950.

NOTE.—Heifer 950 was infested on the 10th February, 1911, with twenty brown nymphae off heifer 909 (Reference No. 373), of which sixteen were fast the following day. A typical East Coast fever reaction followed from the 10th day. *Theileria parva* were detected in the blood for the first time on the 21st day; plasma bodies (agamogonous forms) were found in the glands on the 15th day.

The animal was killed on account of East Coast fever on the 24th day (6th March, 1911), and examination of the glands and spleen showed the presence of plasma bodies.

(a) INTRAJUGULAR INJECTIONS *on the 6th March, 1911, with 20 c.c. spleen pulp (coarse grain) of Heifer 950.*

(A).—*Heifer 1153, about two years old, a Cape Province animal, which arrived at the Laboratory in December, 1910.*

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A slight reaction followed, continuing until the 13th day. Another reaction, typical for East Coast fever, followed from the 14th to 28th days.

(b) Microscopical examination of blood: *Theileria parva* were detected in the blood for the first time on the 25th day; plasma bodies were found in the glands on the 15th day. The animal died of East Coast fever on the 28th day, and examination of the glands and spleen showed the presence of plasma bodies in fairly frequent numbers. *Babesia bigemina* were found in smears from the liver.

(B).—*Heifer 1161, about three years old, a Cape Province animal, which arrived at the Laboratory in October, 1910.*

NOTE.—This animal had been used previously on one occasion without contracting the disease, namely, on the 3rd January, 1911, for an intrathoracic injection of spleen pulp of ox 179 [*vide* Experiment No. 8 (z)].

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: Irregular records were noted for the first few days; a definite reaction commenced on the 14th day, lasting for fifteen days.

(b) Microscopical examination of blood: Small piroplasms were noted on the 16th and 25th days; *Babesia bigemina* were seen on the 15th and 17th days. Puncture of the lymphatic glands on the 16th day proved the presence of plasma bodies.



*Immunity Test.*—Exposed on the farm Burnside on the 28th April, 1911, and died of poverty on the 29th day. The examination of the glands and spleen gave negative results.

(C).—*Heifer* 1195, about two years old, a Cape Province animal, which arrived at the Laboratory in December, 1910.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: Irregular records were noted for the first few days, and a definite reaction set in from the 12th day, reaching the maximum of 105° F. on the 15th day and descending to normal seven days later.

(b) Microscopical examination of blood: Negative. Puncture of the lymphatic glands every forty-eight hours from the 14th to 28th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, 1911. A reaction was noted from the 16th to 30th days, and two days later plasma bodies were seen in the glands. The animal died on the 57th day after exposure.

(b) INTRAJUGULAR INJECTIONS *on the 6th March, 1911, with 40 c.c. of a mixture of spleen, muscle, liver, and kidney pulp in equal quantities of Heifer 950.*

(D).—*Cow* 974, about four years old; purchased in the Transvaal; history unknown.

NOTE.—This animal had been used previously on one occasion without contracting the disease, namely, on the 3rd January, 1911, for a subcutaneous injection of spleen pulp of ox 179 [*vide* Experiment No. 8 (e)].

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A reaction commenced immediately after injection, reaching 106° F. on the 8th day and returning to normal four days later, from which date another reaction set in. The animal developed symptoms of pneumonia, and died on the 20th day.

(b) Microscopical examination of the lymphatic glands on the 17th day showed the presence of plasma bodies. Examination of the spleen and glands after death also showed the presence of plasma bodies, both gamonts and agamonts being detected.

(c) INTRAJUGULAR INJECTIONS *on the 6th March, 1911, with 30 c.c. of a mixture containing spleen pulp (coarse grain) of Heifer 950, mixed with glycerine in equal quantities.*

(E).—*Heifer* 1192, about two and a half years old, a Cape Province animal, which arrived at the Laboratory in December, 1910.

*Treatment.*—Injected as above.

*Remarks.*—The animal calved soon after injection. Microscopical examination of the lymphatic glands on the 21st day showed the presence of plasma bodies.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, 1911. A reaction set in from the 14th day, and the animal died of East Coast fever fourteen days later, when plasma bodies were noted in the spleen and glands.

(d) INTRAJUGULAR INJECTIONS *on the 6th March, 1911, with 20 c.c. of mixture containing spleen pulp (coarse grain) of Heifer 950, mixed in equal quantities with grape sugar.*

(F).—*Heifer 944, about five years old; purchased in the Transvaal; history unknown.*

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: Some irregular records followed, but in no way characteristic.

(b) Microscopical examination of the lymphatic glands on the 17th and 25th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, 1911, and had to be killed fourteen days later on account of a broken leg. Microscopical examination of the spleen and glands gave negative results.

(e) INTRAJUGULAR INJECTIONS *on the 6th March, 1911, with 20 c.c. of a mixture containing spleen pulp (coarse grain) of Heifer 950, mixed in equal quantities with a 10 per cent. salt solution.*

(G).—*Cow 687, about five years old; purchased in the Transvaal; history unknown.*

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: No definite reaction followed.

(b) Microscopical examination of the lymphatic glands on the 14th and 17th days showed the presence of plasma bodies.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, 1911. A typical East Coast fever reaction set in from the 15th day, with a remission on the 23rd day, and death occurred on the 29th day; plasma bodies were noted to be very frequent in the glands during the reaction.

(f) INTRAJUGULAR INJECTIONS *on the 6th March, 1911, with 30 c.c. of a mixture containing spleen pulp (coarse grain) of Heifer 950, added to equal quantities of horse, sheep, and goat blood.*

(H).—*Heifer 832, about four years old, a Cape Province animal, which arrived at the Laboratory in April, 1909.*

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: Reaction from the 14th to 25th days.

(b) Microscopical examination of the lymphatic glands on five occasions gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, 1911, and was still alive on the 31st August, 1911.

(g) INTRAJUGULAR INJECTIONS on the 6th March, 1911, with 20 c.c. of a mixture containing spleen pulp (coarse grain) of Heifer 950, mixed with equal quantities of quartz sand.

(I).—Heifer 953, about four years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A fever reaction set in immediately, lasting for eight days, and followed by a second reaction continuing until the 23rd day.

(b) Microscopical examination of the lymphatic glands on the 17th day showed the presence of plasma bodies.

*Immunity Test.*—Exposed on the farm Burnside on the 28th April, 1911, and was still alive on the 31st August, 1911.

## SUMMARY OF EXPERIMENT NO. 15,

### With Material from Heifer 950.

NUMBER OF DAYS WHICH ELAPSED BETWEEN INFESTATION OF ANIMAL WITH TICKS AND DEATH: 24.

NUMBER OF DAYS WHICH ELAPSED BETWEEN THE DATE OF THE FIRST RISE OF TEMPERATURE AND DEATH: 14.

(No bacteria were found in the smears taken immediately after death.)

#### DETAILS OF INJECTIONS AND RESULTS.

Ref. No.	Animal injected.	No. of times the animal was injected previously or subsequently.	References to these injections.	Method of injection.	Quantity injected.	Material injected.		Result.	Result of exposure at Burnside.	REMARKS.
						Pulp of	Grain.			
A.	Heifer 1153	—	—	Intrajugular	20 c.c.	Spleen.....	Coarse	R.P. †	—	
B.	Heifer 1161	1	Expt. 8 z	"	"	" .....	"	R.P.R.	† O.C. 29th day.	
C.	Heifer 1195	—	—	"	"	" .....	"	R.R.	R.P.R.	Died on 57th day after exposure from poverty.
D.	Cow 974	1	Expt. 8 E	"	"	Spleen, muscle, liver, and kidney	"	R.P. †	—	Death complicated with pneumonia.
E.	Heifer 1192	—	—	"	"	Spleen (mixed with glycerine)	"	R.P.R.	R.P. †	Plasma bodies were noted in this animal after injection, and again after exposure.
F.	Heifer 944	—	—	"	"	Spleen (mixed with grape sugar)	"	I.R.	Killed on 14th day on account of accident	
G.	Cow 687	—	—	"	"	Spleen (mixed with salt solution)	"	(I.R.) P.R.	R.P. †	Plasma bodies were noted in this animal after injection, and again after exposure.
H.	Heifer 832	—	—	"	"	Spleen (mixed with blood of horse, sheep, and goat)	"	R.R.	Still alive (127 days)	
I.	Heifer 953	—	—	"	"	Spleen (mixed with quartz sand)	"	R.P.R.	Still alive (127 days)	

#### EXPLANATION OF SYMBOLS.

R.R.—Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

I.R.—Indicates that the animal had an irregular reaction and recovered.

† O.C.—Indicates that the animal died later of other causes, and that East Coast fever could not be considered to be in any way responsible for death.

R.P. †.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and died of East Coast fever.

R.P.R.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and recovered.

## RESULTS.

Of nine animals injected intrajugularly with spleen pulp of heifer 950 (which was killed twenty-four days after the infestation of ticks, or fourteen days after the first rise of temperature), two died of East Coast fever from the injection. Two showed reactions indicative of East Coast fever without the presence of plasma bodies, and three had typical East Coast fever reactions accompanied with parasites. One animal showed an irregular reaction, during which time plasma bodies were noted in the lymphatic glands, and the ninth animal showed an irregular reaction without any plasma bodies.

Of the seven which were exposed to natural infection, one had to be killed on account of an accident, one had an East Coast fever reaction and recovered, two died of East Coast fever, two survived, and one survived for twenty-nine days, when it died of poverty.

Of these two survivors, one had been injected intrajugularly with 20 c.c. spleen pulp mixed with normal horse, sheep, and goat blood, and one with spleen pulp, mixed with quartz sand.

Two animals which showed plasma bodies in the lymphatic glands as the result of the injection, had reactions when exposed to natural infection, and died of East Coast fever.

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 EXPERIMENT No. 16.

## TO NOTE THE EFFECT OF THE INJECTION OF MATERIAL TAKEN FROM HEIFER 952.

NOTE.—Heifer 952 had been injected on the 18th February, 1911, with 25 c.c. spleen and gland pulp of heifer 1155 [*vide* Experiment No. 11 (c)]. A typical East Coast fever reaction set in from the 15th day, and the animal was killed on the 23rd day just after the remission had occurred. *Theileria parva* and plasma bodies were noted in the blood at the time of death and agamonts were detected in the spleen.

(a) INTRAJUGULAR INJECTIONS on the 13th March, 1911, with 20 grammes spleen pulp (coarse grain) of Heifer 952.

(A).—Heifer 1196, about two years old, a Cape Province animal, which arrived at the Laboratory in December, 1910.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A reaction followed the first twelve days, succeeded by a second reaction from the 15th to 23rd days.

(b) Microscopical examination of the lymphatic glands on the 16th, 18th, and 21st days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 28th April, 1911, and died on the 32nd day of poverty. Microscopical examination of the blood and glands gave negative results; *Babesia bigemina* were seen in the smears from the spleen.

(B).—Heifer 1197, about three years old, a Cape Province animal, which arrived at the Laboratory in December, 1910.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A reaction followed from the 2nd to 7th days, with an exacerbation to 104·6° F. on the 5th day. On the 15th day a sudden rise occurred, the temperature reaching 106·8° F. the following day.

- (b) Microscopical examination: Plasma bodies were found in the glands on the 15th day. The animal died of acute East Coast fever on the 17th day, and examination of the glands and spleen showed the presence of plasma bodies.

(C).—*Heifer* 1198, about three years old, a Cape Province animal, which arrived at the Laboratory in December, 1910.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: Irregular records were noted for the first ten days, from which date the temperature steadily commenced to rise, reaching 107·4° F. on the 16th day. The animal died of acute East Coast fever on the 17th day.
- (b) Microscopical examination of the lymphatic glands on the 15th day showed the presence of plasma bodies. Examination of the glands and spleen after death also revealed the presence of plasma bodies (agametes and agamonts).

(D).—*Heifer* 1199, about two and a half years old, a Cape Province animal, which arrived at the Laboratory in December, 1910.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: Irregular reaction for the first eleven days, followed by a sharp rise in the temperature to 107·4° F. on the 16th day.
- (b) Microscopical examination of blood: Plasma bodies were found in the glands on the 15th day. The animal died of acute East Coast fever on the 18th day, and examination of the glands and spleen showed the presence of plasma bodies.

## SUMMARY OF EXPERIMENT NO. 16,

### With Material from Heifer 952.

NUMBER OF DAYS WHICH ELAPSED BETWEEN INFESTATION OF ANIMAL WITH TICKS AND DEATH: 23.

NUMBER OF DAYS WHICH ELAPSED BETWEEN THE DATE OF THE FIRST RISE OF TEMPERATURE AND DEATH: 8.

(NOTE.—Heifer 952 died of East Coast fever as a result of injection.—See Experiment No. 11 C.)

(No bacteria were found in the smears taken immediately after death.)

DETAILS OF INJECTIONS AND RESULTS.						Result of exposure at Burnside.	REMARKS.	
Ref. No.	Animal injected.	Method of injection.	Quantity injected.	Material injected.				Result.
				Pulp of	Grain.			
A.	Heifer 1196	Intrajugular	20 grs.	Spleen . . . . .	Coarse	R.R.	Death attributed to poverty. Acute East Coast fever; death occurred on 17th day. Acute East Coast fever; death occurred on 17th day. Acute East Coast fever; death occurred on 18th day.	
B.	Heifer 1197	"	"	" . . . . .	"	R.P. †.		
C.	Heifer 1198	"	"	" . . . . .	"	R.P. †.		
D.	Heifer 1199	"	"	" . . . . .	"	R.P. †.		

#### EXPLANATION OF SYMBOLS.

R.P. †.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and died of East Coast fever.

R.R.—Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

† O.C.—Indicates that the animal died later of other causes, and that East Coast fever could not be considered to be in any way responsible for death.

## RESULTS.

Of four animals injected intrajugularly with 20 grammes spleen pulp (coarse grain) of heifer 952 (which was killed on the 23rd day after injection, or eight days after the first rise of temperature), three contracted East Coast fever and died, and one had a reaction indicative of East Coast fever, and survived natural infection for thirty-two days, when it died of poverty.

## EXPERIMENT No. 17.

TO NOTE THE EFFECT OF THE INJECTION OF MATERIAL OBTAINED FROM COW 977.

NOTE.—Cow 977 had been injected on the 18th February, 1911, with 30 c.c. spleen pulp of heifer 1155 [*vide* Experiment No. 11 (b)]. A typical East Coast fever reaction set in from the 11th day, the temperature reaching 105·6° F. on the 17th day; a remission to 102° F. was noted twenty-four hours later, from which date another rise set in, the temperature reaching the maximum of 107° F. in the evening of the 24th day. The cow was killed the following morning (15th March, 1911), and examination of the glands and spleen revealed the presence of plasma bodies.

(a) INTRAJUGULAR INJECTIONS *on the 15th March, 1911, with 5 c.c. spleen and gland pulp (coarse grain) of Cow 977.*

(A).—*Heifer 1354, about two years old, a Cape Province animal, which arrived at the Laboratory in February, 1911.*

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: An irregular reaction followed for the first ten days, developing into a definite curve from the 14th to 24th days.

(b) Microscopical examination of blood: Small piroplasms were noted on the 16th day. Puncture of the lymphatic glands on the 14th day showed the presence of plasma bodies in rare numbers.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, 1911, and was still alive on the 31st August, 1911.

(b) INTRAJUGULAR INJECTIONS *on the 15th March, 1911, with 10 c.c. spleen and gland pulp (coarse grain) of Cow 977.*

(B).—*Heifer 1355, about two years old, a Cape Province animal, which arrived at the Laboratory in February, 1911.*

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A fever reaction occurred from the 12th to 16th days.

(b) Microscopical examination of blood: Negative. Puncture of the lymphatic glands on the 13th day showed the presence of plasma bodies.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, 1911, and was still alive on the 31st August, 1911.



(c) INTRAJUGULAR INJECTIONS *on the 15th March, 1911, with 15 c.c. spleen and gland pulp (coarse grain) of Cow 977.*

(C).—*Cow 964, about six years old; purchased in the Transvaal; history unknown.*

*Treatment.*—Injected as above.

*Remarks.*—

- (a) *Temperature:* An irregular reaction set in for the first ten days, but no disturbances were noted subsequently.
- (b) *Microscopical examination of blood:* Negative. Puncture of the lymphatic glands on the 19th day showed the presence of rare plasma bodies (agamonts). The animal was killed on account of poverty on the 22nd day.

(d) INTRAJUGULAR INJECTIONS *on the 15th March, 1911, with 20 c.c. spleen and gland pulp (coarse grain) of Cow 977.*

(D).—*Heifer 837, about four years old, a Cape Province animal, which arrived at the Laboratory in April, 1909.*

*Treatment.*—Injected as above.

*Remarks.*—

- (a) *Temperature:* Slight reaction followed, with one exacerbation to 106° F. on the 16th day.
- (b) *Microscopical examination of blood:* Negative. Puncture of the lymphatic glands on the 16th day revealed the presence of one plasma body (agamont).

*Immunity Test.*—Exposed on the farm Burnside on the 28th April, 1911, and was still alive on the 31st August, 1911.

(e) INTRAJUGULAR INJECTIONS *on the 15th March, 1911, with 25 c.c. spleen and gland pulp (coarse grain) of Cow 977.*

(E).—*Heifer 979, about four years old; purchased in the Transvaal; history unknown.*

*Treatment.*—Injected as above.

*Remarks.*—

- (a) *Temperature:* A high fever set in two days after inoculation, the temperature reaching 106° F. on the 3rd day, and gradually descending until normal limits were reached on the 9th day. During the reaction the heifer refused to feed; a second reaction ensued, lasting from the 12th to 21st days.
- (b) *Microscopical examination of blood:* Negative. Puncture of the lymphatic glands on the 19th day showed the presence of rare agamonts. The heifer died on the 22nd day, the cause of death being gangrenous pneumonia complicated with East Coast fever.

## EXPERIMENT No. 17,

With Material from Cow 677.

(NOTE.—Cow 677 contracted East Coast fever from an artificial injection—*vide* Experiment No. 11 B.)

NUMBER OF DAYS WHICH ELAPSED BETWEEN INFESTATION OF ANIMAL WITH TICKS AND DEATH: 25.

NUMBER OF DAYS WHICH ELAPSED BETWEEN THE DATE OF THE FIRST RISE OF TEMPERATURE AND DEATH: 14.

(No bacteria were found in the smears taken immediately after death.)

DETAILS OF INJECTIONS AND RESULTS.						Result.	Result of exposure at Burnside.	REMARKS.
Ref. No.	Animal injected.	Method of injection.	Quantity injected.	Material injected.				
				Pulp of	Grain.			
A.	Heifer 1354	Intrajugular	5 c.c.	Spleen and gland	Coarse	R.P.R.	Still alive (127 days).	
B.	Heifer 1355	"	10 c.c.	" "	"	R.P.R.	Still alive (127 days).	
C.	Cow 964	"	15 c.c.	" "	"	R.P.	—	The cow was killed on the 22nd day owing to poverty.
D.	Heifer 837	"	20 c.c.	" "	"	R.P.R.	Still alive (127 days).	
E.	Heifer 979	"	25 c.c.	" "	"	R.P. †	—	Death complicated with gangrenous pneumonia.

### EXPLANATION OF SYMBOLS.

R.P.†.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and died of East Coast fever.

R.P.R.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and recovered.

R.P.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies.

## RESULTS.

Of five animals which were injected intrajugularly with spleen and gland pulp (coarse grain) of cow 977 (which contracted East Coast fever from an artificial injection and was killed on the 25th day, or fourteen days after the first rise of temperature), one died of poverty due to East Coast fever and one died of East Coast fever complicated with gangrenous pneumonia; the remaining three had typical East Coast fever reactions, accompanied with plasma bodies, and recovered.

These three survivors were exposed to veld infection, and were still alive at the date of writing.

They had been injected with spleen and gland pulp in the doses of 5, 10, and 20 c.c. respectively.

## EXPERIMENT No. 18.

## TO NOTE THE EFFECT OF THE INJECTION OF MATERIAL OBTAINED FROM BULL 1234.

NOTE.—Bull 1234 was infested on the 18th February, 1911, with twelve brown nymphae off heifer 909 (Reference No. 373). Two days later all twelve ticks were found to be attached.

The temperature of this bull could not be registered owing to the relaxation of the anus.

*Theileria parva* were noted in the blood for the first time on the 20th day; plasma bodies (both forms) were found in the glands on the 20th and 24th days.

The animal was killed on account of East Coast fever on the 26th day, and examination of the spleen and glands showed the presence of plasma bodies (gamogonous forms).

(a) INTRAJUGULAR INJECTIONS *on the 16th March, 1911, with 25 grammes of a mixture consisting of equal parts of spleen and gland pulp (coarse grain) of Bull 1234, added to an extract of spleen and glands of Heifer 950 (vide Experiment No. 15), mixed with equal quantities of normal saline solution, thymol, and camphor.*

(A).—Ox 1410, aged; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: An irregular reaction ensued from the 15th day.

(b) Microscopical examination of the lymphatic glands on the 18th day proved the presence of intracellular agamonts.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, 1911, and was still alive on the 31st August, 1911.

(b) INTRAJUGULAR INJECTIONS *on the 16th March, 1911, with 25 grammes of a mixture consisting of equal parts of spleen and gland pulp (coarse grain) of Bull 1234, added to 25 grammes of quartz sand.*

(B).—Ox 1411, aged; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: Some irregular records were noted for the first nine days, when a definite reaction set in, lasting until the 21st day.

- (b) Microscopical examination of blood: Negative. Puncture of the lymphatic glands at frequent intervals between the 15th and 25th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, 1911. A reaction set in from the 17th day, terminating in the death of the animal on the 33rd day. Plasma bodies were noted in the glands during life, and were also present in the spleen and glands at death.

- (c) INTRAJUGULAR INJECTIONS *on the 16th March, 1911, with 25 grammes of a mixture consisting of equal parts of spleen and gland pulp of Bull 1234, mixed with a glycerine extract of spleen and glands of Heifer 950 (vide Experiment No. 15).*

- (C).—Ox 1412, aged; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: Irregular records obtained during the whole period of observation.  
 (b) Microscopical examination of the lymphatic glands on the 19th day proved the presence of agamonts in rare numbers.

*Immunity Test.*—Exposed on the farm Burnside on the 28th April, 1911, and died on the 5th day of poverty.

- (d) INTRAJUGULAR INJECTIONS *on the 16th March, 1911, with 20 grammes of spleen and gland pulp (coarse grain) of Bull 1234.*

- (D).—Ox 1413, aged; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: Irregular records were observed for the first ten days, followed by a reaction lasting from the 12th to 25th days.  
 (b) Microscopical examination of the lymphatic glands on the 25th day revealed the presence of rare agamonts.

*Immunity Test.*—Exposed on the farm Burnside on the 28th April, 1911, and died on the 44th day. *Post-mortem* examination revealed the presence of a gangrenous pneumonia. Microscopical examination of the blood glands and spleen gave negative results.

- (e) INTRAJUGULAR INJECTIONS *on the 16th March, 1911, with 10 grammes of spleen and gland pulp of Bull 1234.*

- (E).—Ox 1414, aged; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: Some irregular temperatures were noted for the first ten days, followed by a distinct reaction lasting from the 11th to 20th days.  
 (b) Microscopical examination of the blood: Small piroplasms were noted on the 20th day; puncture of the lymphatic glands on the 18th and 20th days showed the presence of plasma bodies (agamonts) in rare numbers.

*Immunity Test.*—Exposed on the farm Burnside on the 28th April, 1911, and was still alive on the 31st August, 1911.

(f) INTRAJUGULAR INJECTIONS on the 16th March, 1911, with 20 grammes of a mixture containing equal parts of spleen and gland pulp of Bull 1234, added to agar in the proportion of 10 to 1.

(F).—Ox 1415, aged; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: No definite reaction followed.

(b) Microscopical examination of blood: Negative. Puncture of the lymphatic glands on the 18th, 19th, and 25th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 1st May, 1911, and died on the 5th day. On examination of the blood small piroplasms were detected, and a few plasma bodies were noted in the glands.

NOTE.—The death of this animal from East Coast fever (on the 50th day) can only be accounted for by accepting that it was a case of a retarded infection from the injection.

## SUMMARY OF EXPERIMENT NO. 18.

With Material from Bull 1234.

NUMBER OF DAYS WHICH ELAPSED BETWEEN INFESTATION OF ANIMAL WITH TICKS AND DEATH: 26.

NUMBER OF DAYS WHICH ELAPSED BETWEEN THE DATE OF THE FIRST RISE OF TEMPERATURE AND DEATH: .

(No bacteria were found in the smears taken immediately after death.)

### DETAILS OF INJECTIONS AND RESULTS.

Ref. No.	Animal injected.	Method of injection.	Quantity injected.	Material injected.		Result.	Result of exposure at Burnside.	REMARKS.
				Pulp of	Grain.			
A.	Ox 1410	Intrajugular	25 grs.	Spleen and gland, mixed with spleen and gland extract of heifer 950, added to normal saline solution, thymol, and camphor	Coarse	R.P.R.	Still alive (127 days).	
B.	Ox 1411	"	"	Spleen and gland, and quartz sand	"	R.R.	R.P. †.	
C.	Ox 1412	"	"	Spleen and gland, mixed with glycerine extract of spleen and glands of heifer 950	"	(I.R.) P.R. † O.C.	—	Died of poverty on 50th day.
D.	Ox 1413	"	20 grs.	Spleen and gland	"	R.P.R.	† O.C. 44th day.	Death due to gangrenous pneumonia.
E.	Ox 1414	"	10 grs.	"	"	R.P.R.	Still alive (127 days).	
F.	Ox 1415	"	20 grs.	Spleen and gland (mixed with agar)	"	† East Coast fever on the 50th day	—	

#### EXPLANATION OF SYMBOLS.

R.P. †.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and died of East Coast fever.

R.P.R.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and recovered.

I.B.—Indicates that the animal had an irregular reaction and recovered.

R.R.—Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

N.R.—Indicates that the animal did not react to the injection.

† O.C.—Indicates that the animal died later of other causes, and that East Coast fever could not be considered to be in any way responsible for death.

## RESULTS.

Of six animals injected intrajugularly with spleen and gland pulp of bull 1234 (which was killed on the 26th day after tick infestation), five contracted the disease and showed plasma bodies, of which one died on the 50th day of East Coast fever, and one on the same day of poverty; the sixth animal showed a reaction indicative of East Coast fever and recovered.

Of the four animals exposed to veld infection, one died of East Coast fever, one of gangrenous pneumonia, and the other two were still alive at the date of writing.

Of the two survivors, one had been injected with spleen and gland pulp (25 grammes) of bull 1234, mixed with a spleen and gland extract of heifer 950, added to normal saline solution, thymol, and camphor, and the other had been injected with 10 grammes of spleen and gland pulp (coarse grain) of bull 1234.

## EXPERIMENT No. 19.

## TO NOTE THE EFFECT OF THE INJECTION OF MATERIAL OBTAINED FROM HEIFER 1363.

NOTE.—Heifer 1363 was infested on the 25th February, 1911, with twenty brown nymphae off heifer 909 (Reference No. 373). On the following day all twenty nymphae were found to be fast. A rise of temperature commenced on the 8th day, and a fever reaction typical for East Coast fever ensued, with a remission on the 21st day. *Theileria parva* were detected in the blood for the first time on the 16th day; plasma bodies (both forms) were found in the glands on the same day. The animal was killed on account of East Coast fever on the 28th day (25th March, 1911), and examination of the spleen and glands showed the presence of plasma bodies in large numbers.

(a) INTRAJUGULAR INJECTIONS on the 25th March, 1911, with 10 c.c. of a mixture consisting of 5 grammes spleen pulp, 5 grammes gland pulp (coarse grain) of Heifer 1363, and 5 grammes peptone.

(A).—Ox 1417, aged; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A slight reaction set in from the 12th to 20th days.

(b) Microscopical examination of blood: Negative. Puncture of the lymphatic glands on the 17th day showed the presence of plasma bodies.

*Immunity Test.*—Exposed on the farm Burnside on the 1st May, 1911. No temperature reaction followed, but as the animal was in very poor condition it was killed on the 44th day, and examination of the spleen revealed the presence of plasma bodies in rare numbers.

(B).—Cow 1418, aged; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: Slight reaction ensued from the 16th day.

(b) Microscopical examination of blood: Negative. Puncture of the lymphatic glands on the 17th day showed the presence of one plasma body.

*Immunity Test.*—Exposed on the farm Burnside on the 28th April, 1911, and was still alive on the 31st August, 1911.

(C).—*Heifer* 1420, about two years old ; purchased in the Transvaal ; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature : A definite reaction set in from the 13th day.

(b) Microscopical examination of blood : *Babesia bigemina* were noted on the 17th and 28th days. Puncture of the lymphatic glands on the 17th day proved the presence of plasma bodies (agamogonous forms).

*Immunity Test.*—Exposed on the farm Burnside on the 28th April, 1911, and was still alive on the 31st August, 1911.

(b) INTRAJUGULAR INJECTIONS on the 25th March, 1911, with 10 c.c. spleen and gland pulp (coarse grain) of *Heifer* 1363.

(D).—*Ox* 482, aged ; purchased in the Transvaal ; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature : No reaction.

(b) Microscopical examination of blood : Negative. Puncture of the lymphatic glands on the 17th, 18th, 24th, 26th, and 27th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 28th April, 1911, and was still alive on the 31st August, 1911.

(E).—*Ox* 669, aged ; purchased in the Transvaal ; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—A reaction followed from the 15th day ; *Theileria parva* were not detected in the blood ; plasma bodies (agamogonous forms) were found in the glands on the 17th day. The animal died of East Coast fever on the 27th day, and examination of the glands and spleen showed the presence of plasma bodies (agamogonous forms).

(F).—*Ox* 1419, aged ; purchased in the Transvaal ; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—A typical East Coast fever reaction followed from the 15th day ; *Theileria parva* were detected in the blood for the first time on the 24th day ; plasma bodies (agamogonous forms) were found in the glands on the 17th day. *Babesia bigemina* were recorded on the 27th day. The animal died of East Coast fever, complicated with redwater, on the 30th day, and examination of the glands and spleen showed the presence of plasma bodies (agamogonous forms).



SUMMARY OF EXPERIMENT No. 19,  
With Material from Heifer 1363.

(No bacteria were found in the smears taken immediately after death.)

NUMBER OF DAYS WHICH ELAPSED BETWEEN INFESTATION OF ANIMAL WITH TICKS AND DEATH: 27.

NUMBER OF DAYS WHICH ELAPSED BETWEEN THE DATE OF THE FIRST RISE OF TEMPERATURE AND DEATH: 19.

DETAILS OF INJECTIONS AND RESULTS.

Ref No.	Animal injected.	Method of injection.	Quantity injected.	Material injected.		Result.	Result of exposure at Burnside.	REMARKS.
				Pulp of	Grain.			
A.	Ox 1417	Intrajugular	10 c.c.	Spleen and glands (mixed with peptone)	Coarse	(I.R.) P.R.	—	† East Coast fever, due to poverty, on the 44th day.
B.	Cow 1418	"	"	" "	"	(I.R.) P.R.	Still alive (127 days).	
C.	Heifer 1420	"	"	" "	"	R.P.R.	Still alive (127 days).	
D.	Ox 482	"	"	" "	"	N.R.	Still alive (127 days).	
E.	Ox 669	"	"	" "	"	R.P. †.	—	
F.	Ox 1419	"	"	" "	"	R.P. †.	—	

EXPLANATION OF SYMBOLS.

R.P. †.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and died of East Coast fever.

I.R.—Indicates that the animal had an irregular reaction and recovered.

R.P.R.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and recovered.

N.R.—Indicates that the animal did not react to the injection.

## RESULTS.

Of six animals injected intrajugularly with spleen and gland pulp (coarse grain) of heifer 1363 (which was killed twenty-seven days after the infestation of ticks, or nineteen days after the first rise of temperature), two died of East Coast fever, three had typical reactions, accompanied with the presence of plasma bodies, and recovered, and one did not react.

The four survivors were exposed to veld infection, and one died of poverty due to East Coast fever, and the remaining three were still alive at the date of writing.

The ox that was killed on account of poverty had shown plasma bodies after injection, and they were again noted on examination of the spleen on *post-mortem*.

## EXPERIMENT No. 20.

TO NOTE THE EFFECT OF THE INJECTION OF MATERIAL OBTAINED FROM COW 676.

NOTE.—Cow 676 was infested on the 5th March, 1911, with twenty brown nymphae off heifer 1168 (Reference No. 500), of which eighteen were fast the following day.

A typical East Coast fever reaction followed from the 10th day, with the remission on the 19th day; plasma bodies were found in the glands on the 23rd day.

The animal was killed on account of East Coast fever on the 25th day (30th March, 1911), and examination of the blood, glands, and spleen showed the presence of plasma bodies in large numbers.

(a) INTRAJUGULAR INJECTIONS on the 30th March, 1911, with 5 c.c. spleen and gland pulp (large grain) of Bull 1434, mixed with peptone.

(A).—Bull 1434, about two years old; purchased in the Transvaal; history unknown.

*Treatment*.—Injected as above.

*Remarks*.—

(a) Temperature: A sharp reaction ensued immediately, returning to normal on the 6th day; a definite reaction set in from the 13th day.

(b) Microscopical examination of blood: *Theileria parva* were detected in the blood for the first time on the 19th day; plasma bodies (gamogonous forms) were found in the glands on the 16th day. The animal died of East Coast fever on the 26th day, and examination of the glands, spleen, and kidneys showed the presence of plasma bodies (agamogonous forms).

(B).—Ox 1424, about three years old; purchased in the Transvaal; history unknown.

*Treatment*.—Injected as above.

*Remarks*.—

(a) Temperature: A slight rise in the temperature was noted for the first five days. A typical reaction set in from the 13th day.

(b) Microscopical examination of blood: *Theileria parva* were detected in the blood for the first time on the 19th day, when *Babesia bigemina* were also recorded. Plasma bodies (agamogonous forms) were found in the glands on the 14th day. The animal died of East Coast fever on the 23rd day, and examination of the glands and spleen showed the presence of plasma bodies.

(b) INTRAJUGULAR INJECTIONS on the 30th March, 1911, with 10 c.c. spleen and gland pulp (large grain) of Cow 676, mixed with peptone.

(C).—Ox 1437, about four years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction set in immediately after injection, returning to normal on the 9th day. A second reaction ensued from the 13th to 28th days.
- (b) Microscopical examination of blood: One intracellular agamont was noted on the 28th day. Puncture on the 16th and 28th days showed the presence of plasma bodies.

*Immunity Test.*—Exposed on the farm Burnside on the 3rd May, 1911, and was still alive on the 31st August, 1911.

(D).—Ox 1440, aged; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction followed, lasting for the first seven days; a definite reaction set in from the 16th day.
- (b) Microscopical examination of blood: *Theileria parva* were detected in the blood for the first time on the 19th day; plasma bodies (agamogonous forms) were found in the glands on the 16th day. The animal died of East Coast fever on the 27th day, and examination of the glands and spleen showed the presence of plasma bodies (agamogonous forms).

(c) INTRAJUGULAR INJECTIONS on the 30th March, 1911, with 15 c.c. gland and spleen pulp (large grain) of Cow 676, mixed with peptone.

(E).—Ox 432, about eight years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A slight reaction followed for the first eight days, succeeded by a definite reaction from the 13th day.
- (b) Microscopical examination of blood: *Theileria parva* were detected in the blood for the first time on the 19th day; plasma bodies (agamogonous forms) were found in the glands on the 16th day. The animal died of East Coast fever on the 27th day, and examination of the glands and spleen showed the presence of plasma bodies.

(F).—Ox 1430, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A sharp rise was noted for the first four days, later followed by a typical reaction starting on the 13th day.

- (b) Microscopical examination of blood : *Theileria parva* were detected in the blood for the first time on the 19th day ; plasma bodies (agamogonous forms) were found in the glands on the 16th day. The animal died of East Coast fever on the 25th day, and examination of the spleen and glands showed the presence of plasma bodies (agamogonous forms).

{d) INTRAJUGULAR INJECTIONS on the 30th March, 1911, with 5 c.c. spleen and gland pulp (large grain) of Cow 676.

{G).—Ox 1433, about four years old ; purchased in the Transvaal ; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature : A reaction followed immediately, lasting till the 10th day. A second reaction ensued from the 16th to 26th days.
- (b) Microscopical examination of blood : *Babesia bigemina* were noted on the 28th day. Puncture of the lymphatic glands on the 19th day revealed the presence of plasma bodies (agamogonous forms) in rare numbers.

*Immunity Test.*—Exposed on the farm Burnside on the 3rd May, 1911, and was still alive on the 31st August, 1911.

{H).—Ox 1435, about two and a half years old ; purchased in the Transvaal ; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature : Irregular records were noted throughout the observation period.
- (b) Microscopical examination of blood : Negative. Puncture of the lymphatic glands on the 18th day showed plasma bodies (agamogonous forms).

*Immunity Test.*—Exposed on the farm Burnside on the 3rd May, 1911, and was still alive on the 31st August, 1911.

(e) INTRAJUGULAR INJECTIONS on the 30th March, 1911, with 10 c.c. spleen and gland pulp (large grain) of Cow 676.

{I).—Ox 1427, about two years old ; purchased in the Transvaal ; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature : Irregular records were noted throughout the period of observation.
- (b) Microscopical examination of blood : Negative. Puncture of the lymphatic glands on the 16th day showed the presence of plasma bodies (agamogonous forms).

*Immunity Test.*—Exposed on the farm Burnside on the 3rd May, 1911, and was still alive on the 31st August, 1911.

(J).—Ox 1431, about five years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A high fever reaction set in immediately after injection, the temperature reaching 106° F. on the 3rd day and returning to normal four days later. A second reaction set in from the 10th day.
- (b) Microscopical examination of blood: *Theileria parva* were not detected in the blood and plasma bodies were not found in the glands. The animal died of East Coast fever on the 19th day, and examination of the spleen showed the presence of plasma bodies in rare numbers.

(f) INTRAJUGULAR INJECTIONS on the 30th March, 1911, with 15 c.c. spleen and gland pulp (large grain) of Cow 676.

(K).—Ox 1439, aged; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A slight reaction followed from the 3rd to 6th days. A definite reaction set in from the 13th day.
- (b) Microscopical examination of blood: *Theileria parva* were detected in the blood for the first time on the 22nd day; plasma bodies (agamogonous forms) were found in the glands on the 18th day. The animal died of East Coast fever on the 29th day, complicated with gangrenous pneumonia, and examination of the spleen and glands showed the presence of plasma bodies.

(L).—Ox 1429, about four years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A definite reaction set in from the 14th day, lasting until the 27th day.
- (b) Microscopical examination of blood: Negative. Puncture of the lymphatic glands on the 18th, 22nd, and 28th days showed the presence of plasma bodies (agamogonous forms).

*Immunity Test.*—Exposed on the farm Burnside on the 3rd May, 1911, and died on the 54th day, the cause of death being attributed to poverty. No parasites were found in the blood, spleen, or glands.

(g) INTRAJUGULAR INJECTIONS on the 30th March, 1911, with 5 c.c. spleen and gland pulp (fine grain) of Cow 676, mixed with peptone.

(M).—Ox 1438, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A slight reaction followed from the 16th day.
- (b) Microscopical examination of blood: Negative. Plasma bodies were seen in the lymphatic glands on the 18th day.

*Immunity Test.*—Exposed on the farm Burnside on the 3rd May, 1911, and was still alive on the 31st August, 1911.

(N).—*Bull* 1436, about one and a half year old ; purchased in the Transvaal ; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) *Temperature* : Some irregular records were noted for the first twenty days.

(b) *Microscopical examination of blood* : Negative. Puncture of the lymphatic glands on eight days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 3rd May, 1911, and was still alive on the 31st August, 1911.

(h) INTRAJUGULAR INJECTIONS on the 30th March, 1911, with 10 c.c. spleen and gland pulp (fine grain) of Cow 676, mixed with peptone.

(O).—*Ox* 1421, aged ; purchased in the Transvaal ; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) *Temperature* : A sharp rise to 102° F. set in the following day ; a definite reaction ensued from the 14th day.

(b) *Microscopical examination of blood* : Small piroplasms were noted on the 19th and 22nd days. Puncture of the lymphatic glands on the 14th day showed the presence of plasma bodies.

*Immunity Test.*—Sent to Burnside on the 3rd May, 1911, but had to be killed on account of poverty before it reached the farm.

(P).—*Bull* 1428, about one and a half year old purchased in the Transvaal ; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) *Temperature* : A slight reaction set in immediately after injection, lasting for eleven days. A second reaction ensued from the 22nd day onwards, and the animal died on the 30th day of anaemia.

(b) *Microscopical examination of blood* : Small piroplasms were noted on the 22nd day ; plasma bodies were observed in the lymphatic glands on the 25th and 28th days and at death.

(i) INTRAJUGULAR INJECTIONS on the 30th March, 1911, with 15 c.c. spleen and gland pulp (fine grain) of Cow 676, mixed with peptone.

(Q).—*Heifer* 1426, about three years old ; purchased in the Transvaal ; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) *Temperature* : An irregular reaction followed, lasting until the 14th day.

(b) *Microscopical examination of blood* : Small piroplasms were noted on the 22nd and 28th days. Puncture of the lymphatic glands on seven days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 3rd May, 1911. A reaction followed from the 17th day, terminating in the death of the animal on the 33rd day from East Coast fever. On examination of the glands and spleen on *post-mortem*, plasma bodies were found.

(R).—Ox 1422, about three years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A slight reaction followed almost immediately, succeeded by a second indefinite reaction.
- (b) Microscopical examination of blood: Small piroplasms were noted on the 22nd and 28th days. Puncture of the lymphatic glands on eight days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 3rd May, 1911, and died on the 39th day from poverty. Microscopical examination of the spleen and glands gave negative results.

SUMMARY OF EXPERIMENT NO. 20,  
With Material from Cow 676.

(No bacteria were found in the smears taken immediately after death.)

NUMBER OF DAYS WHICH ELAPSED BETWEEN INFESTATION OF ANIMAL WITH TICKS AND DEATH: 25.

NUMBER OF DAYS WHICH ELAPSED BETWEEN THE DATE OF THE FIRST RISE OF TEMPERATURE AND DEATH: 15.

DETAILS OF INJECTIONS AND RESULTS.

Ref. No.	Animal injected.	Method of injection.	Quantity injected.	Material injected.		Result.	Result of exposure at Burnside.	REMARKS.
				Pulp of	Grain.			
A.	Bull 1434	Intra-jugular	5 c.c.	Spleen and gland (mixed with peptone)	Large	R.P. †.	—	
B.	Ox 1424	"	"	"	"	R.P. †.	—	
C.	Ox 1437	"	10 c.c.	"	"	R.P.R.	Still alive (127 days).	
D.	Ox 1440	"	"	"	"	R.P. †.	—	
E.	Ox 432	"	15 c.c.	"	"	R.P. †.	—	
F.	Ox 1430	"	"	"	"	R.P. †.	—	
G.	Ox 1433	"	5 c.c.	Spleen and glands	"	R.P.R.	Still alive (127 days).	
H.	Ox 1435	"	"	"	"	(I.R.) P.R.	Still alive (127 days).	
I.	Ox 1427	"	10 c.c.	"	"	(I.R.) P.R.	Still alive (127 days).	
J.	Ox 1431	"	"	"	"	R.P. †.	—	
K.	Ox 1439	"	15 c.c.	"	"	R.P. †.	—	
L.	Ox 1429	"	"	"	"	R.P.R.	† O.C. 54th day.	Death complicated with purulent pneumonia.
M.	Ox 1438	"	5 c.c.	Spleen and glands (mixed with peptone)	Fine	R.P.R.	Still alive (127 days).	Death attributed to poverty.
N.	Bull 1436	"	"	"	"	N.R.	Still alive (127 days).	
O.	Ox 1421	"	10 c.c.	"	"	R.P.R. († O.C.)	—	Killed before exposure on account of poverty.
P.	Bull 1428	"	"	"	"	R.P. †.	—	Death complicated with anaemia.
Q.	Heifer 1426	"	15 c.c.	"	"	I.R.	R.P. †.	
R.	Ox 1422	"	"	"	"	I.R.	† O.C. 39th day.	

EXPLANATION OF SYMBOLS.

R.P. †.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and died of East Coast fever.

R.P.R.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and recovered.

I.R.—Indicates that the animal had an irregular reaction and recovered.

R.R.—Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

N.R.—Indicates that the animal did not react to the injection.

† O.C.—Indicates that the animal died later of other causes, and that East Coast fever could not be considered to be in any way responsible for death.



## RESULTS.

Of eighteen animals injected intrajugularly with spleen and gland pulp of cow 676 (which was killed on the 25th day after tick infestation, or fifteen days after the first rise of temperature), eight died of East Coast fever, seven had reaction accompanied with plasma bodies and recovered (one of which was killed later on account of poverty), two had irregular reactions, and one did not react.

Of the nine animals exposed to veld infection, one died of East Coast fever and two of poverty; the remaining six were still alive at the date of writing.

One of these six survivors had been injected with 10 c.c. spleen and gland pulp (large grain), mixed with peptone; three were injected with spleen and gland pulp (large grain), without peptone; and two with spleen and gland pulp (fine grain), with peptone.

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 EXPERIMENT No. 21.

 TO NOTE THE EFFECT OF THE INJECTION OF MATERIAL OBTAINED  
 FROM HEIFER 1356.

NOTE.—Heifer 1356 was infected on the 8th April, 1911, with twenty brown nymphae off heifer 1158 (Reference No. 500). After an incubation time of ten days the temperature rose to 105° F., and remained high for the next six days.

*Theileria parva* were detected in the blood for the first time on the 16th day; plasma bodies (both forms) were found in the glands on the same day.

The animal was killed on account of East Coast fever on the 24th day, and examination of the spleen and glands showed the presence of plasma bodies.

(a) INTRAJUGULAR INJECTIONS on the 2nd May, 1911, with 5 c.c. spleen and gland pulp (coarse grain) of Heifer 1356, mixed with peptone in the proportion of 5 to 1.

(A).—Ox 1382, about four years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A reaction followed from the 12th day, reaching 105·4° F. four days later, and returning to normal about the 22nd day.

(b) Microscopical examination of blood: Small piroplasms were noted on the 21st day. Puncture of the lymphatic glands on the 15th day showed the presence of plasma bodies. The gland examination on the 20th and 24th days proved negative.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, and was still alive on the 31st August, 1911.

(B).—Ox 1398, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction followed from the 14th to 22nd days, with an exacerbation to 104·8° F. on the 18th day.
- (b) Microscopical examination of blood: Small piroplasms were noted on the 21st and 25th days. Puncture of the lymphatic glands on the 15th, 20th, and 24th days gave negative results, but plasma bodies were detected on the 18th day in rare numbers.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, and was still alive on the 31st August, 1911.

(C).—Ox 1399, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: An irregular reaction followed from the 14th day.
- (b) Microscopical examination of blood: Small piroplasms were noted on the 21st day. Plasma bodies were seen on the 15th day, but examination on the 20th and 24th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, and was still alive on the 31st August, 1911.

(D).—Ox 1401, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A slight reaction followed from the 13th to 27th days.
- (b) Microscopical examination of blood: Small piroplasms were noted on the 21st day. Plasma bodies were seen in the lymphatic glands on the 15th day, but examination on the 20th and 24th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, and was still alive on the 31st August, 1911.

(E).—Ox 1402, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction followed from the 14th to 20th days, with a maximum temperature of 104·4° F. on the 16th day.

- (b) Microscopical examination of blood: Small piroplasms were noted on the 21st day. Plasma bodies in very rare numbers were seen in the lymphatic glands on the 15th day, but negative results were obtained on the 20th and 24th days.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, and was still alive on the 31st August, 1911.

- (F).—Ox 1478, about three years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: Some irregular records were noted during the first eleven days. From the 12th to 21st days a definite reaction set in, with a maximum temperature of  $104^{\circ}$  F. on the 18th day.
- (b) Microscopical examination of blood: Negative. Plasma bodies were seen in the lymphatic glands on the 15th and 20th days.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, and was still alive on the 31st August, 1911.

- (G).—Ox 1482, about three years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A typical reaction set in from the 13th day, with a maximum temperature of  $105^{\circ}$  F. during the first half of the reaction, and reaching  $106.8^{\circ}$  F. on the 22nd day.
- (b) Microscopical examination of blood: *Theileria parva* were detected in the blood for the first time on the 21st day; plasma bodies were found in the glands from the 15th day onwards. The animal died of East Coast fever on the 23rd day, and examination of the spleen and glands showed the presence of plasma bodies (both forms).

- (H).—Ox 1483, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A slight reaction followed from the 13th day, the temperature reaching  $104^{\circ}$  F. in the evening of the 16th day and returning to normal on the 25th day.
- (b) Microscopical examination of blood: *Babesia bigemina* were noted on the 24th day. Plasma bodies in very rare numbers were seen in the lymphatic glands on the 18th day, but examination on the 15th, 20th, and 24th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911 and was still alive on the 31st August, 1911.

(I).—Ox 1488, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: Some irregular records were noticed for the first fortnight, and a sharp rise to 104° F. was recorded on the 17th day.
- (b) Microscopical examination of blood: Small piroplasms were noted on the 21st day. Plasma bodies were seen in the lymphatic glands on the 15th day, but the examination on the 20th and 24th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911. A reaction was noticed soon after exposure, and one plasma body (agamont) was detected in the lymphatic glands. The ox was still alive on the 31st August, 1911.

(J).—Bull 1490, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: Irregular records were noted for the first eleven days, developing into a reaction which lasted until the 21st day, with an evening record of 106° F. on the 17th day.
- (b) Microscopical examination of blood: Negative. Plasma bodies were seen in the lymphatic glands on the 18th day, but the examination on the 20th and 24th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, and was still alive on the 31st August, 1911.

(b) INTRAJUGULAR INJECTIONS on the 2nd May, 1911, with 10 c.c. spleen and gland pulp (coarse grain) of Heifer 1356, mixed with equal parts of peptone.

(K).—Ox 1389, about four years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction commenced on the 15th day, reaching 105° F. in the evening of the 16th day and in the morning of the following day, descending to normal on the 20th day.
- (b) Microscopical examination of blood: Negative. Puncture of the lymphatic glands on the 15th day showed the presence of plasma bodies, but examination on the 20th and 24th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, and was still alive on the 31st August, 1911.

(L).—Ox 1397, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A sharp rise occurred from the 14th day, reaching 106·4° F. on the 17th day, and returning to normal the following day.
- (b) Microscopical examination of the lymphatic glands on the 15th day showed the presence of plasma bodies, and the ox died of acute East Coast fever on the 18th day, when plasma bodies (agamogonous forms) were recorded as very frequent.

(M).—Ox 1403, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction commenced on the 14th day, with a temperature of 105° F. on the 18th day, and returning to normal on the 25th day.
- (b) Microscopical examination of blood: Small piroplasms were noted on the 21st and 25th days. Plasma bodies were seen in the lymphatic glands on the 18th day, but the examination on the 15th and 24th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, where it died of poverty on the 34th day; the microscopical examination of the glands and spleen proved negative.

(N).—Ox 1459, about six years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction set in from the 15th day, somewhat of an irregular nature, with a record of 107° F. on the 23rd day.
- (b) Microscopical examination of blood: *Theileria parva* were detected for the first time on the 21st day; plasma bodies (agamogonous forms) were found in the glands on the 17th, 20th, and 24th days. The animal died of East Coast fever on the 25th day, and examination of the spleen and glands showed the presence of plasma bodies (agamogonous forms).

(O).—Ox 1470, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A definite reaction set in from the 15th day, with an average evening temperature of 104° F., returning to normal on the 27th day.

- (b) Microscopical examination of blood: Small piroplasms were noted on the 21st and 24th days. Plasma bodies were seen in the lymphatic glands on the 18th, 20th, and 24th days.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, and was still alive on the 31st August, 1911.

(P).—Ox 1474, about three years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction commenced on the 14th day, the temperature rising steadily until the 23rd day, when it reached 106·8° F.
- (b) Microscopical examination of blood: *Theileria parva* were detected in the blood for the first time on the 21st day; *Babesia bigemina* were noted on the 21st and 24th days; plasma bodies (both forms) were found in the glands on the 15th, 20th, and 24th days. The animal was killed on account of East Coast fever on the 26th day, and examination of the spleen and glands showed the presence of plasma bodies (agamogonous forms).

(Q).—Ox 1481, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction set in from the 14th day, reaching the maximum of 106° F. on the 18th day; a remission occurred on the 21st day, and the second half of the reaction followed from the 22nd day, with the maximum record of 106° F. on the 27th day.
- (b) Microscopical examination of blood: *Theileria parva* were detected in the blood for the first time on the 21st day; *Babesia bigemina* were seen on the 21st and 24th days; plasma bodies were found in the glands on the 15th, 20th, and 24th days. The animal died of East Coast fever, complicated with redwater, on the 29th day, and examination of the spleen and glands showed the presence of plasma bodies.

(R).—Ox 1485, about three years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction set in from the 14th day.
- (b) Microscopical examination of blood: *Theileria parva* were detected in the blood for the first time on the 21st day; plasma bodies were found in the glands on the 15th and 20th days. The animal died of East Coast fever on the 23rd day, and examination of the spleen and glands showed the presence of plasma bodies (agamogonous forms).

(S).—Ox 1487, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction followed from the 14th to 22nd days, with a maximum temperature of 106° F. on the 19th and 20th days.
- (b) Microscopical examination of blood: Small piroplasms were noted on the 21st day. Plasma bodies were seen in the lymphatic glands on the 17th and 20th days.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, and was still alive on the 31st August, 1911.

(T).—Ox 1491, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: Irregular records were noted from the 14th day onwards, with occasional evening temperatures of 104° F.
- (b) Microscopical examination of blood: Negative. Puncture of the lymphatic glands on the 15th, 18th, 20th, and 24th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 2nd May, 1911. A reaction was noted during which plasma bodies (agamogonous forms) were noted in the glands, and small piroplasms were detected in the blood. The ox was still alive on the 31st August, 1911.

(c) INTRAJUGULAR INJECTIONS *on the 2nd May, 1911, with 5 c.c. spleen and gland pulp (coarse grain) of Cow 1356.*

(U).—Ox 1376, about four years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A mild reaction followed from the 17th to 28th days.
- (b) Microscopical examination of blood: Negative. Puncture of the lymphatic glands on the 20th and 24th days also gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, and was still alive on the 31st August, 1911.

(V).—Ox 1379, about three years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction followed from the 13th to 24th days, with the maximum record of 106° F. in the evening of the 17th day.

- (b) Microscopical examination of blood: Small piroplasms were noted on the 21st and 24th days. Plasma bodies were seen in the lymphatic glands on the 18th and 20th days, but the examination on the 24th day gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, and was still alive on the 31st August, 1911.

(W).—Ox 1391, about five years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction ensued from the 13th day, reaching 107·4° F. on the 17th day, followed by a remission on the 20th day, and a rise to 107·6° F. on the 23rd day.
- (b) Microscopical examination of the blood: *Theileria parva* were detected for the first time on the 21st day; *Babesia bigemina* were seen on the 24th and 27th days; plasma bodies were found in the glands on the 15th, 20th, and 24th days. The animal died of East Coast fever, complicated with redwater, on the 28th day, and examination of the spleen and glands showed the presence of plasma bodies (agamogenous forms).

(X).—Ox 1458, about seven years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: No definite reaction followed.
- (b) Microscopical examination of blood: Negative. Puncture of the lymphatic glands on the 20th and 24th days gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, and was still alive on the 31st August, 1911.

(Y).—Ox 1461, about seven years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction followed from the 14th day, reaching the maximum of 107° F. on the 23rd day.
- (b) Microscopical examination of blood: *Theileria parva* were detected in the blood for the first time on the 21st day. Plasma bodies were found in the glands on the 17th, 20th, and 24th days. The animal died of East Coast fever on the 25th day, but examination of the spleen and glands failed to reveal the presence of plasma bodies. *Theileria parva* were noted in the blood.



(Z).—Ox 1467, about eight years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction ensued from the 14th day, the temperature gradually rising until 107° F. was reached on the 25th day.
- (b) Microscopical examination of blood: *Theileria parva* were detected in the blood for the first time on the 21st day; plasma bodies were found in the glands on the 15th, 20th, and 24th days. The animal died of East Coast fever on the 26th day, and examination of the spleen and glands showed the presence of plasma bodies (agamogonous forms.)

(A 1).—Ox 1427, about three years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: An irregular reaction followed.
- (b) Microscopical examination of blood: Negative. Puncture of the lymphatic glands on the 17th, 18th, 20th, and 24th days also gave negative results.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, where a reaction occurred, and microscopical examination of the glands revealed the presence of plasma bodies in rare numbers. The animal was still alive on the 31st August, 1911.

(B 1).—Ox 1472, about six years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: Some irregular records were noted after injection, with an exacerbation to 106° F. in the evening of the 17th day and morning of the 18th day.
- (b) Microscopical examination of blood: Small piroplasms were noted on the 21st and 27th days. *Babesia bigemina* were seen on the 24th and 27th days. Plasma bodies in rare numbers were seen in the lymphatic glands on the 15th day.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, and was still alive on the 31st August, 1911.

(C 1).—Ox 1479, about three years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: Some irregular temperatures were noted for the first few days after injection. On the 14th day a rise occurred, reaching 105° F. on the 15th day.

- (b) Microscopical examination of blood: Plasma bodies (agamogonous forms) were found in the glands on the 15th day. The animal died of East Coast fever on the 17th day, but examination of the spleen and glands failed to reveal the presence of plasma bodies.

(D 1).—Ox 1480, about three years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A definite reaction commenced on the 13th day, lasting until the 20th day, with a maximum temperature of 106° F. on the 18th day.
- (b) Microscopical examination of blood: *Babesia bigemina* were noted on the 21st day. Plasma bodies were seen in the lymphatic glands on the 15th and 20th days.

*Immunity Test.*—Exposed on the farm Burnside on the 5th June, 1911, where it developed an attack of East Coast fever, and died on the 35th day. The examination of the glands and spleen showed the presence of plasma bodies (agamogonous forms) in rare numbers.

## SUMMARY OF EXPERIMENT NO. 21,

With Material from Heifer 1356.

NUMBER OF DAYS WHICH ELAPSED BETWEEN INFESTATION OF ANIMAL WITH TICKS AND DEATH: 24.

NUMBER OF DAYS WHICH ELAPSED BETWEEN THE DATE OF THE FIRST RISE OF TEMPERATURE AND DEATH: 14.

(No bacteria were found in the smears taken immediately after death.)

DETAILS OF INJECTIONS AND RESULTS.							Result of exposure at Burnside.	REMARKS.
Ref. No.	Animal injected.	Method of injection.	Quantity injected.	Material injected.		Result.		
				Pulp of	Grain.			
A.	Ox 1382	Intrajugular	5 c.c.	Spleen and gland (mixed with peptone, proportion of 5 to 1)	Coarse	R.P.R.	Still alive (87 days).	
B.	Ox 1398	"	"	"	"	R.P.R.	Still alive (87 days).	
C.	Ox 1399	"	"	"	"	(I.R.) P.R.	Still alive (87 days).	
D.	Ox 1401	"	"	"	"	R.P.R.	Still alive (87 days).	
E.	Ox 1402	"	"	"	"	R.P.R.	Still alive (87 days).	
F.	Ox 1478	"	"	"	"	R.P.R.	Still alive (87 days).	
G.	Ox 1482	"	"	"	"	R.P. †	—	
H.	Ox 1483	"	"	"	"	R.P.R.	Still alive (87 days).	
I.	Ox 1488	"	"	"	"	(I.R.) P.R.	R.P.R. (still alive).	This ox showed plasma bodies after injection, and again after exposure.
J.	Bull 1490	"	"	"	"	R.P.R.	Still alive (87 days).	
K.	Ox 1389	"	10 c.c.	Spleen and gland (mixed with peptone in equal parts)	"	R.P.R.	Still alive (87 days).	
L.	Ox 1397	"	"	"	"	R.P. †	—	
M.	Ox 1403	"	"	"	"	R.P.R.	+ O.C. 34th day.	Death due to poverty.
N.	Ox 1459	"	"	"	"	R.P. †	—	
O.	Ox 1470	"	"	"	"	R.P.R.	Still alive (87 days).	

P.	Ox 1474	"	"	"	"	"	R.P. †	—	
Q.	Ox 1481	"	"	"	"	"	R.P. †	—	
R.	Ox 1485	"	"	"	"	"	R.P. †	—	
S.	Ox 1487	"	"	"	"	"	R.P.R.	Still alive (87 days).	
T.	Ox 1491	"	"	"	"	"	I.R.	R.P.R. (still alive, 87 days).	
U.	Ox 1376	"	5 c.c.	Spleen and gland	"	"	R.R.	Still alive (87 days).	
V.	Ox 1379	"	"	"	"	"	R.P.R.	Still alive (87 days).	
W.	Ox 1391	"	"	"	"	"	R.P. †	—	
X.	Ox 1458	"	"	"	"	"	N.R.	Still alive (87 days).	
Y.	Ox 1461	"	"	"	"	"	R.P. †	—	
Z.	Ox 1467	"	"	"	"	"	R.P. †	—	
A 1.	Ox 1471	"	"	"	"	"	I.R.	R.P.R. (still alive, 87 days).	
B 1.	Ox 1472	"	"	"	"	"	(I.R.) P.R.	Still alive (87 days).	
C 1.	Ox 1479	"	"	"	"	"	R.P. †	—	
D 1.	Ox 1480	"	"	"	"	"	R.P.R.	R.P. †	This ox showed plasma bodies after injection, and again after exposure.

#### EXPLANATION OF SYMBOLS.

- R.P. †.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and died of East Coast fever.
- R.P.R.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and recovered.
- R.R.—Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.
- I.R.—Indicates that the animal had an irregular reaction and recovered.
- N.R.—Indicates that the animal did not react to the injection.
- † O.C.—Indicates that the animal died later of other causes, and that East Coast fever could not be considered to be in any way responsible for death.

## RESULTS.

Of thirty animals injected intrajugularly with spleen and gland pulp (coarse grain) of heifer 1356 (which was killed twenty-four days after infestation of ticks, or fourteen days after the first rise of temperature), ten contracted East Coast fever and died as a result of the injection; sixteen reacted and showed the presence of plasma bodies in the lymphatic glands; one did not react (and proved immune when exposed to natural infection); and two had irregular reactions (they contracted East Coast fever and recovered when exposed to natural infection); one had a reaction indicative of East Coast fever and recovered (proving immune to natural infection).

Twenty animals were exposed to veld infection, and one died of East Coast fever (relapse); three contracted East Coast fever and recovered (one relapse), and one died of anaemia on the 34th day. Eighteen were still alive at the time of writing.

Of these eighteen animals, nine had been injected with 5 c.c. spleen and gland pulp, mixed with peptone in the proportion of 5 to 1; four with 10 c.c. spleen and gland pulp, mixed with equal parts of peptone; and five with 5 c.c. spleen and gland pulp, without peptone.

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 EXPERIMENT No. 22.

## TO NOTE THE EFFECT OF THE INJECTION OF MATERIAL TAKEN FROM HEIFER 1362.

NOTE.—Heifer 1362 was infested on the 17th April, 1911, with twenty brown nymphal ticks off heifer 1363 (Reference No. 474); all twenty were found fast the following day. A temperature reaction started on the 14th day, reaching 106° F. on the 19th and 20th days; the remission occurred on the 23rd day and the second half of the reaction commenced the following day, the temperature touching the maximum of 106° F. on the 27th and 28th days, on which latter day the animal was killed (15th May, 1911).

*Theileria parva* were detected in the blood for the first time on the 25th day; plasma bodies were found in the glands on the same day. The examination of the spleen and glands after death showed the presence of plasma bodies (both forms) in large numbers.

(a) SUBCUTANEOUS INJECTIONS on the 15th May, 1911, with 10 c.c. spleen pulp (coarse grain) of Heifer 1362, mixed with 5 c.c. powdered agar.

(A).—Ox 1460, about five years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A slight reaction was noted for the first sixteen days.

(b) Microscopical examination of the lymphatic glands on the 17th day gave negative results.

NOTE.—This animal was used later on the 23rd June, 1911 [*vide* Experiment No. 23 (j)] for an intrajugular injection of spleen and gland pulp of heifer 1358. Finally was infested on the 15th July, 1911 with brown nymphal ticks. No reaction followed.

(b) SUBCUTANEOUS INJECTIONS on the 15th May, 1911, with 10 c.c. spleen and gland pulp (coarse grain) of Heifer 1362, mixed with 5 c.c. peptone.

(B).—Ox 546, about four years old, a Cape Province animal, which arrived at the Laboratory in March, 1908.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: With the exception of a rise to 104° F. on the 15th day, no temperature disturbance followed.

(b) Microscopical examination of the lymphatic glands on the 17th and 19th days gave negative results.

NOTE.—This animal was used later on the 23rd June, 1911 [*vide* Experiment No. 23 (c)], for an intrajugular injection of spleen and gland pulp of heifer 1358, later infested on the 15th July, 1911, with brown nymphae. A reaction followed from the 11th day, and plasma bodies (gamogonous forms) were noted in the glands on the 17th day; the ox died of East Coast fever on the 30th day.

(c) SUBCUTANEOUS INJECTIONS on the 15th May, 1911, with 10 c.c. spleen and gland pulp (coarse grain) of Heifer 1363, mixed with 5 c.c. aleuronat.

(C).—Bull 1477, about three years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A reaction set in immediately, the temperature returning to normal on the 8th day (a swelling appeared at the seat of inoculation); a definite reaction set in from the 14th day, reaching 105° F. on the 17th, 18th, and 19th days, lasting until the 23rd day.

(b) Microscopical examination of blood: Small piroplasms were noted on the 24th day. Plasma bodies were seen in the lymphatic glands on the 17th and 24th days.

*Immunity Tests.*—

(1) Infested on the 12th June, 1911, with brown nymphae off heifer 1158 (Reference No. 500). [*Note.*—See Experiment No. 25 (l); heifer 1158 contracted East Coast fever from the infestation of twenty ticks of the same batch.]

*Remarks.*—A large number of ticks were found attached the following day.

(2) Reinfested on the 15th June, 1911, with brown nymphae as above. A number were found fast the following day.

(3) Reinfested on the 19th June, 1911, with brown nymphae as above. A number were found fast the following day.

(4) Reinfested on the 27th June, 1911, with brown nymphae off cattle Nos. 1366 (Reference No. 537), 909 (Reference No. 431), 1358 (Reference No. 500), and 1363 (Reference No. 474). [*Note.*—See Experiment No. 25; all these ticks were infective.]

*Remarks.*—A large number were found attached the following day.

A slight reaction followed, but microscopical examination of the glands was negative. In the blood piroplasms were found to be fairly frequent and were identified as *Babesia mutans*.

(d) INTRAMUSCULAR INJECTIONS on the 15th May, 1911, with 10 c.c. spleen and gland pulp (coarse grain) of Heifer 1362, mixed with 5 c.c. powdered agar.

(D).—Ox 1484, about three years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A reaction followed immediately, lasting until the 13th day.

(b) Microscopical examination of the lymphatic glands on the 17th day gave negative results.

NOTE.—This animal was used later on the 23rd June, 1911 [*vide* Experiment No. 23 (k)], for an intrajugular injection of spleen and gland pulp of heifer 1358. Later infested on the 15th July, 1911, with brown nymphae, when it contracted East Coast fever, and recovered.

(e) INTRAMUSCULAR INJECTIONS on the 15th May, 1911, with 10 c.c. spleen and gland pulp (coarse grain) of Heifer 1362, mixed with 5 c.c. peptone.

(E).—Ox 1473, about four years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: Some irregular records followed and a slight swelling formed at the seat of injection. A definite reaction ensued from the 15th day, the remission occurring on the 26th day, and the second half of the reaction continuing from the following day. The temperature reached its maximum of 106·8° F. on the 28th day.

(b) Microscopical examination of blood: *Theileria parva* were detected in the blood for the first time on the 24th day; plasma bodies (agamogonous forms) were found in the glands on the 17th and 24th days. The animal died of East Coast fever on the 29th day, and examination of the spleen and glands showed plasma bodies (both forms) to be fairly frequent.

(f) INTRAMUSCULAR INJECTIONS on the 15th May, 1911, with 10 c.c. spleen and gland pulp (coarse grain) of Heifer 1362, mixed with 5 c.c. aleuronat.

(F).—Ox 1466, about five years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A reaction followed immediately and a swelling formed at the seat of injection.

(b) Microscopical examination: Puncture of the lymphatic glands on the 16th and 19th days gave negative results.

*Immunity Tests.*—

(1) Infested on the 12th June, 1911, with brown nymphae off heifer 1158 (Reference No. 500). [*Note.*—See Experiment No. 25 (l); heifer 1158 contracted East Coast fever from the infestation of twenty ticks of the same batch.]

*Remarks.*—A large number of ticks were found attached the following day.

- (2) Reinfested on the 15th June, 1911, with brown nymphae as above. A number were found fast the following day.
- (3) Reinfested on the 19th June, 1911, with brown nymphae as above. A number were found attached the following day.

*Remarks.*—A reaction followed the 13th day after the first infestation, the temperature reaching 106° F. on the 17th day. The remission was noted on the 23rd day, and the second half of the reaction set in, the temperature passing 106° F. The animal was killed on account of East Coast fever on the 29th day, and examination of the spleen and glands showed the presence of *Theileria parva* and plasma bodies (agamogonous forms). Owing to the presence of bacteria in the spleen, the animal was rejected for inoculation purposes.

(g) INTRAJUGULAR INJECTIONS on the 15th May, 1911, with 10 c.c. spleen and gland pulp (coarse grain) of Heifer 1362, mixed with 5 c.c. powdered agar.

(G).—Ox 1425, about two and a half years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—No reaction followed and no examinations of gland juice were made.

NOTE.—This animal was used later on the 23rd June, 1911 [*vide* Experiment No. 23 (i)], for an intrajugular injection of spleen and gland pulp of heifer 1358. Later was infested on the 15th July, 1911, with brown nymphae without results.

(H) Ox 1378, about ten years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: No reaction.

(b) Microscopical examination of the lymphatic glands on the 17th day gave negative results.

NOTE.—This animal was used later on the 23rd June, 1911 [*vide* Experiment No. 23 (h)], for an intrajugular injection of spleen and gland pulp of heifer 1358, and died of East Coast fever on the 21st day.

(h) INTRAJUGULAR INJECTIONS on the 15th May, 1911, with 10 c.c. spleen and gland pulp of Heifer 1362, mixed with peptone.

(I).—Ox 1486, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A reaction followed almost immediately, lasting until the 13th day.

(b) Microscopical examination of the lymphatic glands on the 17th day showed the presence of plasma bodies in rare numbers.



*Immunity Tests.*—

- (1) Infested on the 12th June, 1911, with brown nymphae off heifer 1158 (Reference No. 500). [*Note.*—See Experiment No. 25 (*l*); heifer 1158 contracted East Coast fever from the infestation of twenty ticks of the same batch.]

*Remarks.*—A large number were fast the following day.

- (2) Reinfested on the 15th June, 1911, with brown nymphae as above.

*Remarks.*—A number of ticks were fast the following day.

- (3) Reinfested on the 19th June, 1911, with brown nymphae as above.

*Remarks.*—A number of ticks were fast the following day.

- (4) Reinfested on the 27th June, 1911, with brown nymphae off cattle Nos. 1356 (Reference No. 527), 909 (Reference No. 431), 1358 (Reference No. 500), and 1363 (Reference No. 474). (*Note.*—See Experiment No. 25; all these ticks were infective.)

*Remarks.*—A number were found attached the following day. A slight reaction followed, but microscopical examination of the glands and spleen gave negative results.

- (*J*).—*Ox* 1476, about three years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (*a*) Temperature: A reaction set in from the 13th day, the temperature reaching 106° F. on the 17th and 18th days. The remission occurred on the 20th day, and the second half of the reaction ensued from the following day, with a maximum temperature of 107·2° F. on the 23rd day.

- (*b*) Microscopical examination of blood: *Theileria parva* were detected in the blood for the first time on the 24th day; plasma bodies were found in the glands on the 17th and 24th days. The animal died of East Coast fever on the 25th day.

- (*i*) INTRAJUGULAR INJECTIONS on the 15th May, 1911, with 10 c.c. spleen and gland pulp (coarse grain) of Heifer 1362, mixed with 5 c.c. aleuronat.

- (*K*).—*Ox* 1394, about three years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (*a*) Temperature: No definite reaction followed, although some temperature disturbances occurred indicative of a slight curve.

- (*b*) Microscopical examination of the lymphatic glands on the 17th and 19th days gave negative results.

*Immunity Tests.*—

- (1) Infested on the 12th June, 1911, with brown nymphae off heifer 1158 (Reference No. 500). [*Note.*—See Experiment No. 25 (*l*); heifer 1158 contracted East Coast fever from the infestation of twenty ticks of the same batch.]

*Remarks.*—A large number of ticks were found attached the following day.

- (2) Reinfested on the 15th June, 1911, with brown nymphae as above. A number were found fast the following day.
- (3) Reinfested on the 19th June, 1911, with brown nymphae as above. A number were found attached the following day.
- (4) Reinfested on the 27th June, 1911, with brown nymphae off cattle Nos. 1356 (Reference No. 537), 909 (Reference No. 431), 1358 (Reference No. 500), and 1363 (Reference No. 474). (*Note.*—See Experiment No. 25; all these ticks were infective.)

*Remarks.*—A large number were found attached the following day. No reaction followed.

(L).—*Ox.* 1390, about four years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: No definite reaction followed, but there were some temperature disturbances indicative of a slight curve.
- (b) Microscopical examination of the lymphatic glands on the 17th and 19th days gave negative results.

*Immunity Tests.*—

- (1) Infested on the 12th June, 1911, with brown nymphae off heifer 1158 (Reference No. 500). [*Note.*—See Experiment No. 25 (i); heifer 1158 contracted East Coast fever from the infestation of twenty ticks of the same batch.]

*Remarks.*—A large number were fast the following day.

- (2) Reinfested on the 15th June, 1911, with brown nymphae as above.

*Remarks.*—A number of ticks were fast the following day.

- (3) Reinfested on the 19th June, 1911, with brown nymphae as above.

*Remarks.*—A number of ticks were fast the following day.

- (4) Reinfested on the 27th June, 1911, with brown nymphae off cattle 1356 (Reference No. 527), 909 (Reference No. 431), 1358 (Reference No. 500), and 1363 (Reference No. 474). (*Note.*—See Experiment No. 25; all these ticks were infective.)

*Remarks.*—A number were found attached the following day. A slight reaction ensued nineteen days after infestation, during which piroplasms and anaplasms were noted in the blood, but examination of the glands gave negative results.

SUMMARY OF EXPERIMENT NO. 22,  
With Material from Heifer 1362.

NUMBER OF DAYS WHICH ELAPSED BETWEEN INFESTATION OF ANIMAL WITH TICKS AND DEATH: 28.

NUMBER OF DAYS WHICH ELAPSED BETWEEN THE DATE OF THE FIRST RISE OF TEMPERATURE AND DEATH: 14.

(No bacteria were found in the smears taken immediately after death.)

DETAILS OF INJECTIONS AND RESULTS.									DETAILS OF TESTS ON IMMUNITY.			REMARKS.
Ref. No.	Animal injected.	No. of times the animal was injected subsequently	References to these injections.	Method of injection.	Quantity injected.	Material injected.		Result.	No. of times tested with ticks.	Result.		
						Pulp of	Grain.			No. of tick infestation.		
A.	Ox 1460	1	Expt. 23 J	Subcutaneous	10 c.c.	Spleen (mixed with agar powder)	Coarse	I.R.	—	—	—	For final history see Experiment 23 J (no reaction). For final history see Experiment 23 C (contracted East Coast fever from ticks and died).
B.	Ox 546	1	Expt. 23 C	"	"	Spleen and gland (mixed with peptone)	"	I.R.	—	—	—	
C.	Bull 1477	—	—	"	"	Spleen and gland (mixed with aleuronat)	"	R.P.R.	4	—	N.R.	For final history see Experiment 23 K (contracted East Coast fever from ticks and recovered).
D.	Ox 1484	1	Expt. 23 K	Intramuscular	"	Spleen and gland (mixed with agar powder)	"	I.R.	—	—	—	
E.	Ox 1473	—	—	"	"	Spleen and gland (mixed with peptone)	"	R.P. †	—	—	—	Killed on the 29th day.
F.	Ox 1466	—	—	"	"	Spleen and gland (mixed with aleuronat)	"	I.R.	1	1	R.P. †	
G.	Ox 1425	1	Expt. 23 I	Intrajugular	"	Spleen and gland (mixed with agar powder)	"	N.R.	—	—	—	For final history see Experiment 23 I (proved immune to tests). For final history see Experiment 23 H (R.P. † to injection).
H.	Ox 1378	1	Expt. 23 H	"	"	" " "	"	N.R.	—	—	—	
I.	Ox 1486	—	—	"	"	Spleen and gland (mixed with peptone)	"	(I.R.) P.R.	4	—	N.R.	For final history see Experiment 23 I (proved immune to tests). For final history see Experiment 23 H (R.P. † to injection).
J.	Ox 1476	—	—	"	"	" " "	"	R.P. †	—	—	—	
K.	Ox 1394	—	—	"	"	Spleen and gland (mixed with aleuronat)	"	I.R.	4	—	N.R.	For final history see Experiment 23 I (proved immune to tests). For final history see Experiment 23 H (R.P. † to injection).
L.	Ox 1390	—	—	"	"	" " "	"	I.R.	4	—	N.R.	

EXPLANATION OF SYMBOLS.

R.P. †.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and died of East Coast fever.

I.R.—Indicates that the animal had an irregular reaction and recovered.

R.P.R.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and recovered.

N.R.—Indicates that the animal did not react to the injection.

## RESULTS.

Of twelve animals injected with material taken from heifer 1362 (which was killed twenty-eight days after tick infestation, or fourteen days after the first rise of temperature), four contracted the disease, of which two died; the remaining eight gave irregular or no reactions, and when exposed to tick infestation, three contracted the disease. One reacted to a subsequent injection and died of East Coast fever, and the remaining four were still alive at the date of writing.

The subcutaneous injection conveyed the disease to one animal out of three; of three animals injected intramuscularly, one contracted East Coast fever and died; and of six animals injected intrajugularly, one died and one reacted.

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 EXPERIMENT No. 23.

TO NOTE THE EFFECT OF THE INJECTION OF MATERIAL TAKEN FROM HEIFER 1358.

NOTE.—Heifer 1358 was infested with brown nymphae off heifer 1158 (Reference No. 500) on the 27th May, 1911. A reaction set in from the 10th day, reaching 107° F. on the following day. There was a slight remission to 103° F. in the morning of the 21st day, followed by a rise to 106° F. on the 25th and 26th days.

The animal was killed on the 27th day (23rd June, 1911). The blood was examined during the reaction at repeated intervals. The fever reaction commenced with the appearance of anaplasms, succeeded later by *Babesia bigemina*, and finally by *Theileria parva*. The examination of the glands showed the presence of plasma bodies, which were frequently met with the progress of the fever, and after death both gamogonous and agamogonous forms were noted in the spleen and in the glands.

(a) SUBCUTANEOUS INJECTIONS on the 23rd June, 1911, with 10 c.c. spleen and gland pulp (coarse grain) of Heifer 1358, mixed with 5 grammes aleuronat.

(A).—Bull 1508, about one year old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A slight temperature disturbance ensued from the 13th day onwards.
- (b) Microscopical examination of the lymphatic glands on the 14th, 17th, and 19th days gave negative results.

*Immunity Test.*—Infested on the 15th July, 1911, with about one hundred brown nymphae off cattle 1356 (Reference No. 527), 909 (Reference No. 431), 1158 (Reference No. 500), and 1363 (Reference No. 474). [Note.—See Experiment No. 25 (k), (g), (l), and (m); all these ticks were infective.]

*Remarks.*—A large number were fast the following day. No reaction followed.

B).—Ox 1630, about one and a half year old ; born in the Transvaal.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: Some irregular temperature records occurred, more pronounced from the 14th day onwards, when 104° F. was registered on several occasions.
- (b) Microscopical examination of the lymphatic glands on the 14th, 17th, and 19th days gave negative results.

*Immunity Test.*—Infested on the 15th July, 1911, with about one hundred brown nymphae off cattle 1356 (Reference No. 527), 909 (Reference No. 431), 1158 (Reference No. 500), and 1363 (Reference No. 474). [Note.—See Experiment No. 25 (*k*), (*g*), (*l*), and (*m*); all these ticks were infective.]

*Remarks.*—A large number were fast the following day. A reaction set in from the 13th day, and plasma bodies were noted in the glands four days later. The ox was killed for experimental purposes on the 27th day.

†(C).—Ox 1632, about one and a half year old ; born in the Transvaal.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A sharp rise to 106° F. was noted on the 2nd day, and an indefinite reaction followed from the 11th day.
- (b) Microscopical examination of the lymphatic glands on the 14th, 17th, and 19th days gave negative results.

*Immunity Test.*—Infested on the 15th July, 1911, with about one hundred brown nymphae off cattle 1356 (Reference No. 527), 909 (Reference No. 431), 1158 (Reference No. 500), and 1363 (Reference No. 474). [Note.—See Experiment No. 25 (*k*), (*g*), (*l*), and (*m*); all these ticks were infective.]

*Remarks.*—A large number were fast the following day. A reaction ensued from the 11th day. Plasma bodies were seen in the lymphatic glands on the 17th day, and the animal died 13 days later of East Coast fever.

†(b) INTRAMUSCULAR INJECTIONS on the 23rd June, 1911, with 10 grammes spleen and gland pulp (coarse grain) of Heifer 1358, mixed with 5 c.c. peptone.

‡(D).—Ox 1381, about seven years old ; purchased in the Transvaal ; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A slight curve was noticeable from the 12th day onwards.
- (b) Microscopical examination: Puncture of the lymphatic glands on the 14th, 17th, and 19th days gave negative results.

*Immunity Test.*—Infested on the 15th July, 1911, with about one hundred brown nymphae off cattle 1356 (Reference No. 527), 909 (Reference No. 431), 1158 (Reference No. 500), and 1363 (Reference No. 475). [Note.—See Experiment No. 25 (*k*), (*g*), (*l*), and (*m*); all these ticks were infective.]

*Remarks.*—A large number were fast the following day. A temperature reaction ensued from the 13th day, and four days later plasma bodies were seen in the lymphatic glands. Death occurred on the 27th day.

(E).—*Ox* 1400, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: From the 12th day onwards a slight temperature disturbance occurred, characterized by morning and evening records above normal.

(b) Microscopical examination: Puncture of the lymphatic glands on the 14th, 17th, and 19th days gave negative results.

*Immunity Test.*—Infested on the 15th July, 1911, with about one hundred brown nymphae off cattle 1356 (Reference No. 527), 909 (Reference No. 431), 1158 (Reference No. 500), and 1363 (Reference No. 474). [Note.—See Experiment No. 25 (k), (g), (l), and (m); all these ticks were infective.]

*Remarks.*—A large number were fast the following day. No reaction followed.

(c) SUBCUTANEOUS INJECTIONS on the 23rd June, 1911, with 10 grammes spleen and gland pulp (coarse grain) of Heifer 1358, mixed with 5 grammes peptone.

(F).—*Heifer* 1497, about one and a half year old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A slight reaction ensued from the 12th day onwards, the temperature touching 104° F. on the 21st and 23rd days.

(b) Microscopical examination: Puncture of the lymphatic glands on the 14th, 17th, and 19th days gave negative results.

*Immunity Test.*—Infested on the 15th July, 1911, with about one hundred brown nymphae off cattle 1356 (Reference No. 527), 909 (Reference No. 431), 1158 (Reference No. 500), and 1363 (Reference No. 474). [Note.—See Experiment No. 25 (k), (g), (l), and (m); all these ticks were infective.]

*Remarks.*—A large number were fast the following day. No reaction followed.

(d) INTRAJUGULAR INJECTIONS on the 23rd June, 1911, with 10 c.c. spleen and gland pulp (coarse grain) of Heifer 1358, mixed with 5 c.c. peptone.

(G).—*Ox* 546, about four years old, a Cape Province animal; arrived at the Laboratory in March, 1908.

NOTE.—This animal had been used previously on one occasion without contracting the disease, namely, on the 15th May, 1911, for a subcutaneous injection of spleen and gland pulp of heifer 1362 [*vide* Experiment No. 22 (b)].

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature : No reaction.  
 (b) Microscopical examination of the lymphatic glands on the 17th and 19th days gave negative results.

*Immunity Test.*—Infested on the 15th July, 1911, with brown nymphae off cattle 1356 (Reference No. 527), 909 (Reference No. 431), 1158 (Reference No. 500), and 1363 (Reference No. 474). (*Note.*—See Experiment No. 25 ; all these ticks were infective.)

*Remarks.*—A large number were fast the following day. A reaction ensued from the 11th day, and plasma bodies were found in the lymphatic glands four days later. The animal died on the 30th day from East Coast fever.

(H).—Ox 1378, about ten years old ; purchased in the Transvaa ; history unknown.

*NOTE.*—This animal had been used previously on one occasion, namely, on the 15th May, 1911, for an intrajugular injection of spleen and gland pulp of heifer 1362 [*vide* Experiment No. 22 (h)].

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature : A reaction set in from the 13th day, the temperature rising gradually until 105° F. was registered on the 19th day.  
 (b) Microscopical examination of the lymphatic glands on the 14th and 17th days gave negative results. Plasma bodies (agamogonous forms) were found in the glands on the 19th day. The animal died of East Coast fever on the 21st day, and examination of the spleen and glands showed the presence of plasma bodies (agamogonous forms).

(I).—Ox 1425, about two and a half years old ; purchased in the Transvaal ; history unknown.

*NOTE.*—This animal had been used previously on one occasion without contracting the disease, namely, on the 15th May, 1911, for an intrajugular injection of spleen and gland pulp of heifer 1362 [*vide* Experiment No. 22 (g)].

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature : A slight disturbance was noted, and one evening exacerbation to 103° F. on the 12th day occurred.  
 (b) Microscopical examination of the lymphatic glands on the 15th, 18th, and 20th days gave negative results.

*Immunity Test.*—Infested on the 15th July, 1911, with about one hundred brown nymphae off cattle 1356 (Reference No. 527), 909 (Reference No. 431), 1158 (Reference No. 500), and 1363 (Reference No. 474). [*Note.*—See Experiment No. 25 (k), (g), (l), and (m) ; all these ticks were infective.]

*Remarks.*—A large number were fast the following day. No reaction ensued.

(J).—*Ox* 1460, about five years old; purchased in the Transvaal; history unknown.

NOTE.—This animal had been used previously on one occasion without contracting the disease, namely, on the 15th May, 1911, for a subcutaneous injection of spleen and gland pulp of heifer 1362 [*vide* Experiment No. 22 (b)].

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A reaction followed from the 12th day, the temperature rising above 104° F. in the evening and 103° F. in the morning, and returning to normal on the 17th day.

(b) Microscopical examination of the lymphatic glands on the 14th, 17th, and 19th days gave negative results.

*Immunity Test.*—Infested on the 15th July, 1911, with one hundred brown nymphae off cattle 1356 (Reference No. 527), 909 (Reference No. 431), 1158 (Reference No. 500), and 1363 (Reference No. 474). [*Note.*—See Experiment No. 25 (k), (g), (l), and (m); all these ticks were infective.]

*Remarks.*—A large number of ticks were fast the following day. No reaction ensued.

(K).—*Ox* 1484, about three years old; purchased in the Transvaal; history unknown.

NOTE.—This animal had been used previously on one occasion without contracting the disease, namely, on the 15th May, 1911, for an intramuscular injection of spleen and gland pulp of heifer 1362 [*vide* Experiment No. 22 (d)].

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A slight temperature disturbance followed from the 13th day.

(b) Microscopical examination of the lymphatic glands on the 14th, 17th, and 19th days gave negative results.

*Immunity Test.*—Infested on the 15th July, 1911, with about one hundred brown nymphae off cattle 1356 (Reference No. 527), 909 (Reference No. 431), 1158 (Reference No. 500), and 1363 (Reference No. 474). [*Note.*—See Experiment No. 25 (k), (g), (l), and (m); all these ticks were infective.]

*Remarks.*—A slight reaction set in from the 13th day, and four days later plasma bodies were seen in the lymphatic glands. The animal eventually recovered.

(e) INTRAJUGULAR INJECTIONS on the 23rd June, 1911, with 5 c.c. spleen and gland pulp (fine grain) of Heifer 1358, mixed with peptone.

(L).—*Bull* 975, about two years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A slight reaction ensued from the 12th day onwards.

(b) Microscopical examination of the lymphatic glands on the 14th, 17th, and 19th days gave negative results.



*Immunity Test.*—Infested on the 15th July, 1911, with about one hundred brown nymphae off cattle 1356 (Reference No. 527), 909 (Reference No. 431), 1158 (Reference No. 500), and 1363 (Reference No. 474). [Note.—See Experiment No. 25 (*k*), (*g*), (*l*), and (*m*); all these ticks were infective.]

*Remarks.*—A large number were fast the following day. No reaction ensued.

(M).—Ox 1464, about eight years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: An immediate curve was noted from the 11th day onwards, with occasional evening records of 104° F.
- (b) Microscopical examination of the lymphatic glands on the 14th, 17th, and 19th days gave negative results.

*Immunity Test.*—Infested on the 15th July, 1911, with about one hundred brown nymphae off cattle 1356 (Reference No. 527), 909 (Reference No. 431), 1158 (Reference No. 500), and 1363 (Reference No. 474). [Note.—See Experiment No. 25 (*k*), (*g*), (*l*), and (*m*); all these ticks were infective.]

*Remarks.*—A large number were fast the following day. No reaction followed. The animal had to be killed on the 38th day on account of poverty. Examination of the glands and spleen gave negative results.

(N).—Ox 1465, about seven years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A definite reaction set in from the 13th day, the temperature reaching 104° F. on the 18th and 19th days.
- (b) Microscopical examination of blood: Plasma bodies (agamo-gonous forms) were found in the glands on the 19th day. The animal died of East Coast fever on the 21st day, and examination of the spleen and glands showed the presence of plasma bodies.

(O).—Ox 1468, about six years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A reaction set in from the 12th day, with a maximum temperature record of 105° F. on the 18th day; the morning temperature averaged from about 103° F.
- (b) Microscopical examination: Puncture of the lymphatic glands on the 14th, 17th, and 19th days gave negative results.

*Immunity Test.*—Infested on the 15th July, 1911, with brown nymphae off cattle 1356 (Reference No. 527), 909 (Reference No. 431), 1358 (Reference No. 500), and 1363 (Reference No. 474). (Note.—See Experiment No. 25; all these ticks were infective.)

*Remarks.*—A number were found attached the following day. No reaction followed. This ox had to be killed on the 26th day on account of a broken leg. No parasites could be detected in the glands or spleen on *post-mortem* examination.

(P).—Ox 1475, about four years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A temperature disturbance was noted from the 11th day.
- (b) Microscopical examination: Puncture of the lymphatic glands on the 14th, 17th, and 19th days gave negative results.

*Immunity Test.*—Infested on the 15th July, 1911, with brown nymphae off cattle 1356 (Reference No. 537), 909 (Reference No. 431), 1358 (Reference No. 500), and 1363 (Reference No. 474). (*Note.*—See Experiment No. 25; all these ticks were infective.)

*Remarks.*—A large number were found attached the following day. No reaction ensued.

EXPERIMENT NO. 23,  
With Material from Heifer 1358.

NUMBER OF DAYS WHICH ELAPSED BETWEEN INFESTATION OF ANIMAL WITH TICKS AND DEATH : 27.

NUMBER OF DAYS WHICH ELAPSED BETWEEN THE DATE OF THE FIRST RISE OF TEMPERATURE AND DEATH : 17.

(No bacteria were found in the smears taken immediately after death.)

DETAILS OF INJECTIONS AND RESULTS.							Result.	DETAILS OF TESTS ON IMMUNITY.			REMARKS.	
Ref. No.	Animal injected.	No of times the animal was injected previously or subsequently	References to these injections.	Method of injection.	Quantity injected.	Material injected		No. of times tested with ticks.	Result.			
									Pulp of	Grain.		No. of tick infestation.
A.	Bull 1508	—	—	Subcutaneous	10 c.c.	Spleen and gland (mixed with aleuronat).	Coarse	I.R.	1	—	N.R.	Killed.
G.	Ox 1630	—	—	"	"	" " " "	"	I.R.	1	—	R.P. †	
C.	Ox 1632	—	—	"	"	" " " "	"	I.R.	1	—	R.P. †	
D.	Ox 1381	—	—	Intramuscular	10 grs.	Spleen and gland (mixed with peptone).	"	I.R.	1	—	R.P. †	
E.	Ox 1400	—	—	"	"	" " " "	"	I.R.	1	—	N.R.	Killed.
F.	Heifer 1497	—	—	Subcutaneous	"	" " " "	"	I.R.	1	—	N.R.	
G.	Ox 546	1	Expt. 22 B	Intrajugular	10 c.c.	" " " "	"	N.R.	1	—	R.P. †	Killed.
H.	Ox 1378	1	Expt. 22 H	"	"	" " " "	"	R.P. †	—	—	—	
I.	Ox 1425	1	Expt. 22 G	"	"	" " " "	"	I.R.	1	—	N.R.	Killed.
J.	Ox 1460	1	Expt. 22 B	"	"	" " " "	"	I.R.	1	—	N.R.	
K.	Ox 1484	1	Expt. 22 D	"	"	" " " "	"	I.R.	1	—	R.P.R.	Killed.
L.	Bull 975	—	—	"	5 c.c.	" " " "	"	I.R.	1	—	N.R.	
M.	Ox 1464	—	—	"	"	" " " "	"	I.R.	1	—	N.R.	Killed.
N.	Ox 1465	—	—	"	"	" " " "	"	R.P. †	—	—	—	
O.	Ox 1468	—	—	"	"	" " " "	"	R.R.	1	—	N.R.	Killed.
P.	Ox 1475	—	—	"	"	" " " "	"	I.R.	1	—	N.R.	

EXPLANATION OF SYMBOLS.

R.P. †.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and died of East Coast fever.  
R.P.R.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and recovered.

R.R.—Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.  
I.R.—Indicates that the animal had an irregular reaction and recovered.  
N.R.—Indicates that the animal did not react to the injection.

## RESULTS.

Of sixteen animals injected with material taken from heifer 1358 (which was killed seventeen days after the first rise of temperature, or twenty-seven days after the tick infestation), two animals contracted the disease and died (both intrajugular injections).

Of the surviving fourteen, five contracted the disease when tested with ticks, and nine did not react. Of these nine, one had been injected subcutaneously with spleen and gland pulp (coarse grain), mixed with aleuronat, and one with spleen and gland pulp (coarse grain), mixed with peptone. One had been injected intramuscularly with 10 grammes spleen and gland pulp (coarse grain), mixed with peptone, and the remaining six had been injected intrajugularly with spleen and gland pulp, mixed with peptone—two with 10 c.c. (coarse grain) and four with 5 c.c. (fine grain).

## EXPERIMENT No. 24.

TO NOTE THE EFFECT OF THE DOUBLE INJECTION OF MATERIAL TAKEN FROM DIFFERENT ANIMALS.

(A).—MATERIAL TAKEN FROM HEIFERS 1155 AND 950.

(The second injection given on the 16th day.)

NOTE.—Heifer 1155 contracted East Coast fever from the infestation of ticks off heifer 1109 (Reference No. 412), and was killed on the 20th day. Material from heifer 1155 had been used for the injection of four other animals (see Experiment No. 11). Heifer 950 contracted East Coast fever from the infestation of ticks off heifer 909 (Reference No. 373), and was killed on the 24th day. Material from heifer 950 had been used for the injection of seventeen animals [see Experiments Nos. 15 and 24 (b), (c), and (d)].

(a) INTRAJUGULAR INJECTIONS *on the 18th February, 1911, with 30 c.c. spleen pulp (coarse grain) of Heifer 1155, followed on the 16th day (6th March, 1911) by an intrajugular injection of 20 c.c. spleen pulp (coarse grain) of Heifer 950.*

(A).—*Bull 591, about four years old; taken from the Afrikander Stock Farm.*

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A reaction lasting for six days followed immediately after the first injection; a second reaction commenced seven days later, returning to normal on the 28th day after the first injection.

(b) Microscopical examination: Puncture of the lymphatic glands on the 17th, 20th, and 23rd days gave negative results, but some bodies resembling plasma granules were seen on the 26th day.

*Immunity Test.*—Exposed at the farm Burnside on the 26th April, 1911, and was still alive on the 31st August, 1911.

(b) INTRAJUGULAR INJECTIONS on the 18th February, 1911, with 25 c.c. spleen and gland pulp (coarse grain) of Heifer 1155, followed on the 16th day (6th March, 1911) by an intrajugular injection of 20 c.c. spleen pulp (coarse grain) of Heifer 950.

(B).—Heifer 586, about three years old, born at the Laboratory.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A definite reaction started previous to the second injection, lasting for about eleven days.
- (b) Microscopical examination of blood: Small piroplasms were noted on the 17th day after the first injection. Puncture of the lymphatic glands on the 17th, 20th, 23rd, and 24th days gave negative results.

*Immunity Test.*—Exposed at Burnside on the 26th April, 1911, and was still alive on the 31st August, 1911.

(B).—MATERIAL TAKEN FROM HEIFERS 1158 AND 950.

(The second injection given on the 15th day.)

NOTE.—Heifer 1158 contracted East Coast fever from the infestation of ticks off heifer 1111 (Reference No. 426), and died on the 26th day. Material from heifer 1158 had been used for the injection of five other animals (see Experiment No. 12).

Heifer 950 contracted East Coast fever from the infestation of ticks off heifer 909 (Reference No. 373), and died on the 24th day. Material from heifer 950 had been used for the injection of seventeen animals [see Experiments Nos. 15 and 24 (a), 24 (c), and 24 (d)].

(c) INTRAJUGULAR INJECTIONS on the 19th February, 1911, with 30 c.c. spleen and gland pulp (coarse grain) of Heifer 1158, followed on the 15th day (6th March, 1911) by an intrajugular injection of 20 c.c. spleen pulp (coarse grain) of Heifer 950.

(C).—Heifer 1160, about three years old, a Cape Province animal, which arrived at the Laboratory in October, 1910.

NOTE.—This heifer had been used previously on the 3rd January, 1911, for an intrathoracal injection of spleen pulp of ox 179 [Experiment No. 8 (y)], without contracting the disease.

*Treatment.*—Injected as above.

*Remarks.*—

- (a) Temperature: A fever reaction followed eleven days after the first injection until the 25th day.
- (b) Microscopical examination of blood: Negative. Puncture of the lymphatic glands on the 20th day showed the presence of plasma bodies.

*Immunity Tests.*—Exposed at Burnside on the 28th April, 1911, and was still alive on the 31st August, 1911.

## (C).—MATERIAL TAKEN FROM HEIFERS 668 AND 950.

(The second injection given on the 13th day.)

NOTE.—Heifer 668 contracted East Coast fever from the infestation of ticks off heifer 909 (Reference No. 373), and was killed on the 25th day. Material from heifer 668 had been used for the injection of four other animals (*vide* Experiment No. 13). Heifer 950 contracted East Coast fever from the infestation of ticks off heifer 909 (Reference No. 373), and was killed on the 24th day. Material from heifer 950 had been used for the injection of seventeen animals [*vide* Experiment Nos. 15, 24 (a), 24 (b), and 24 (d)].

(d) INTRAJUGULAR INJECTIONS on the 21st February, 1911, with 30 c.c. spleen and gland pulp (coarse grain) of Heifer 668, followed on the 13th day by an intrajugular injection of 20 c.c. spleen pulp (coarse grain) of Heifer 950.

(D).—Cow 959, about eight years old; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A reaction followed from the 14th day after the first injection, lasting for about ten days.

(b) Microscopical examination of blood: Small piroplasms were noted on the 21st day. Puncture of the lymphatic glands on the 18th day after the first injection showed the presence of plasma bodies.

NOTE.—This animal was killed on the 8th April (46th day) on account of debility.

(E).—Cow 555, aged, taken over from the Afrikander Stock Farm.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A reaction ensued from about the 10th day after the first injection, lasting for eight days.

(b) Microscopical examination of the blood: Negative. Plasma bodies were noted in the lymphatic glands on the 18th day after the first injection.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, 1911, and was still alive on the 31st August, 1911.

## (D).—MATERIAL TAKEN FROM OX 577 AND HEIFER 950.

(The second injection given on the 6th day.)

NOTE.—Ox 577 contracted East Coast fever from the infestation of ticks off heifer 909 (Reference No. 373) and was killed on the 25th day. Material from ox 577 had been used for the injection of three other animals (*vide* Experiment No. 14). Heifer 950 contracted East Coast fever from the infestation of ticks off heifer 909 (Reference No. 373), and was killed on the 24th day. Material from heifer 950 had been used for the injection of seventeen animals [*vide* Experiments Nos. 15, 24 (a), 24 (b), and 24 (c)].

(e) INTRAJUGULAR INJECTIONS *on the 28th February, 1911, with 20 c.c. spleen pulp (coarse grain) of Ox 577, mixed with 10 grammes peptone, followed on the 6th day (6th March, 1911) by an intrajugular injection of 20 c.c. spleen pulp (coarse grain) of Heifer 950, mixed with 10 grammes agar.*

(F).—Cow 564, aged; purchased in the Transvaal; history unknown.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A reaction commenced about the 14th day after the first injection.

(b) Microscopical examination of blood: Small piroplasms were noted on the 14th, 27th, and 31st days after the first injection. Plasma bodies were seen on the 18th day in the lymphatic glands.

*Immunity Test.*—Exposed on the farm Burnside on the 28th April, 1911, and was still alive on the 31st August, 1911.

(f) INTRAJUGULAR INJECTIONS *on the 28th February, 1911, with 20 c.c. spleen pulp (coarse grain) of Ox 577, mixed with 10 grammes peptone, and followed on the 6th day (6th March, 1911) by an intrajugular injection of 20 c.c. spleen pulp (coarse grain) of Heifer 950.*

(G).—Cow 553, about four years old, purchased in the Cape Province, and arrived at the Laboratory in March, 1908.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: An irregular reaction followed from the 10th day after the first injection, lasting for twenty days.

(b) Microscopical examination of the blood: Negative. Puncture of the lymphatic glands on seven occasions gave negative results.

NOTE.—This cow died on the 15th April, 1911 (46th day), of endocarditis (sequel to East Coast fever).

(g) INTRAJUGULAR INJECTIONS *on the 28th February, 1911, with 30 grammes spleen pulp (coarse grain) of Ox 577, followed on the 6th day (6th March, 1911) by an intrajugular injection of 20 c.c. spleen pulp (coarse grain) of Heifer 950.*

(H).—Cow 215, aged, had been at the Laboratory since 1905.

*Treatment.*—Injected as above.

*Remarks.*—

(a) Temperature: A reaction ensued eight days after the first injection, lasting for fifteen days.

(b) Microscopical examination of blood: Negative. Plasma bodies were seen on the 18th day in the lymphatic glands.

*Immunity Test.*—Exposed on the farm Burnside on the 26th April, 1911, and was still alive on the 31st August, 1911.

SUMMARY OF EXPERIMENT NO. 24,

With Material from { Heifers 1155 and 950.  
 " 1158 and 950.  
 " 668 and 950.  
 Ox 577 and 950.

NUMBER OF DAYS WHICH ELAPSED BETWEEN INFESTATION OF ANIMALS WITH TICKS AND DEATH :—Heifer 1155.....20. Heifer 668.....25.  
 Heifer 950.....24. Ox 577.....25.  
 Heifer 1158.....26.

NUMBER OF DAYS WHICH ELAPSED BETWEEN THE DATE OF THE FIRST RISE OF TEMPERATURE AND DEATH :—Heifer 1155.....15. Heifer 668.....14.  
 Heifer 950.....14. Ox 577.....15.  
 Heifer 1158.....16.

(No bacteria were found in the smears taken immediately after death.)

DETAILS OF INJECTIONS AND RESULTS.

Ref. No.	Animal injected.	No. of times the animal was injected previously.	References to these injections.	Method of injection.	Quantity injected.	Material injected.		Result.	Result of exposure at Burnside.	REMARKS.
						Pulp of	Grain.			
A.	Bull 591	—	—	Intrajugular	30 c.c.	Spleen of Heifer 1155.....	} Coarse	R.(?P.)R.	Still alive (127 days)	
B.	Heifer 586	—	—	"	20 c.c.	Spleen of Heifer 950.....				
					25 c.c.	Spleen and gland of Heifer 1155				
C.	Heifer 1160	1	Expt. 8 Y	"	20 c.c.	Spleen of Heifer 950.....	} "	R.R.	Still alive (127 days)	
					30 c.c.	Spleen and gland of Heifer 1158				
D.	Cow 950	—	—	"	20 c.c.	Spleen of Heifer 950.....	} "	R.P.R.	—	
					30 c.c.	Spleen and gland of Heifer 668				
E.	Cow 555	—	—	"	20 c.c.	Spleen of Heifer 950.....	} "	R.P.R.	Still alive (127 days)	
F.	Cow 564	—	—	"	"	Spleen of Ox 577 (mixed with peptone)				
G.	Cow 553	—	—	"	"	Spleen of Heifer 950 (mixed with agar)	} "	R.P.R.	Still alive (127 days)	
					"	Spleen of Ox 577 (mixed with peptone)				
H.	Cow 215	—	—	"	30 grs.	Spleen of Heifer 950.....	} "	R.P.R.	Still alive (127 days)	
					20 c.c.	Spleen of Ox 577 ..... Spleen of Heifer 950.....				

EXPLANATION OF SYMBOLS.

R.P.R.—Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and recovered.  
 R.R.—Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

I.R.—Indicates that the animal had an irregular reaction and recovered.  
 † O.C.—Indicates that the animal died later of other causes, and that East Coast fever could not be considered to be in any way responsible for death.



## RESULTS.

Of eight animals injected intrajugularly (double injection at intervals varying between six and thirteen days), five contracted the disease and recovered. Seven animals were exposed to veld infection and six were still alive at the date of writing, one cow having died of endocarditis as a sequel of embolism on the 46th day.

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 EXPERIMENT No. 25.

TO NOTE WHETHER THE TICKS USED TO TEST THE IMMUNITY OF THE INJECTED ANIMALS WERE INFECTED.

- (a) *Brown nymphae off Heifer 1013 (Reference No. 319).*  
 (See article "Some Observations concerning the Transmission of East Coast Fever by Ticks", Experiment No. 2.) These ticks failed to transmit the disease in nine animals.
- (b) *Brown nymphae off Heifer 908 (Reference No. 364).*  
 (See article "Some Observations concerning the Transmission of East Coast Fever by Ticks", Experiment No. 2.) These ticks failed to transmit the disease in seven instances out of ten.
- (c) *Brown adults, origin Natal (Reference No. 349).*  
 (See article "Some Observations concerning the Transmission of East Coast Fever by Ticks", Experiment No. 2.) These ticks transmitted the disease to five animals out of seven.
- (d) *Brown adults off Heifer 1053 (Reference No. 411).*  
 (See article "Some Observations concerning the Transmission of East Coast Fever by Ticks", Experiment No. 2.) These ticks transmitted the disease to heifer 1046.
- (e) *Brown adults off Heifers 1107, 1053, 1112, and 1109 (Reference Nos. 434, 411, 420, and 412).*  
 Heifer 909 contracted East Coast fever from the infestation of four ticks of this lot, and was killed on the 31st day (*vide* Experiment No. 9).
- (f) *Red-leg adults off Heifer 923 (Reference No. 253).*  
 These ticks did not prove to be infective for any animal.
- (g) *Brown nymphae off Heifer 909 (Reference No. 373).*  
 (See article "Some Observations concerning the Transmission of East Coast Fever by Ticks", Experiment No. 2.) These ticks transmitted the disease to heifer 1037.
- (h) *Brown nymphae off Heifers 913 and 914 (Reference Nos. 355 and 356).*  
 (See article "Some Observations concerning the Transmission of East Coast Fever by Ticks", Experiment No. 2.) These ticks failed to transmit the disease in four instances.
- (i) *Brown nymphae off Heifer 1111 (Reference No. 426).*  
 (See article "Some Observations concerning the Transmission of East Coast Fever by Ticks", Experiment No. 2.) These ticks transmitted the disease to heifer 1046.
- (j) *Brown nymphae off Heifers 1082 and 1107 (Reference Nos. 430 and 435).*  
 Ten animals were infested with this batch of ticks, and none contracted the disease.

(k) *Brown nymphae off Heifer 1363 (Reference No. 474).*

Heifer 1362 was killed on the 28th day after the infestation of twenty ticks of this batch (see Experiment No. 22).

(l) *Brown nymphae off Heifer 1158 (Reference No. 500).*

Heifer 1356 contracted East Coast fever from the infestation of twenty ticks of this batch, and was killed on the 25th day (*vide* Experiment No. 20).

(m) *Brown nymphae off Heifers 1356 (Reference No. 527), 909 (Reference No. 431), 1158 (Reference No. 500), and 1363 (Reference No. 474).*

Ox 1632 contracted East Coast fever from the infestation of about 100 ticks of this batch [*vide* Experiment No. 23 (c)].

\* \* \* \* \*

NOTE.—In the following tables are only included animals that have been injected either once (172 in all) or twice within sixteen days (eight in all). The results of the animals that have been injected repeatedly are summarized in Conclusion No. 13 (b).

Of the 172 animals that have been injected once only, nineteen died, chiefly from accidents due to inoculation, before the disease had time to run its course, and these animals have been excluded from the statistics.

In the cases of the eight animals that have been injected twice within sixteen days (*vide* Experiment No. 24), the first injection conveyed the disease, and the statistics have been worked out according to the particulars of this primary inoculation.

Table "A".

RESULTS arranged according to the Method of Injection.

Method of injection.	INJECTIONS.											TESTS.				Percentage of animals that survived the critical period of the test as compared to the total number of animals injected. (Cols. 2 & 16.)	
	Number of animals injected.	Animals that contracted East Coast fever from injection						Animals that did not react typically to the injection				Total number of animals tested. (Cols. 5 & 9.)	Animals that contracted East Coast fever from the tests and died.		Animals that survived the critical period of the test.		
		and died.		and recovered,				and were exposed.	and died before tests.	Total number of non-reactors. (Cols. 9 & 10.)	Per cent. of non-reactors. (Cols. 2 & 11.)		No.	Per-centage. (Cols. 13 & 14.)	No.		Per-centage. (Cols. 13 & 16.)
		No.	Per-centage. (Cols. 2 & 3.)	and were exposed. (Col. 13.)	and died before tests.	Total No. of recoveries. (Cols. 5 & 6.)	Per cent. of recoveries. (Cols. 2 & 7.)										
(1)	(2)	(3)	(4) %	(5)	(6)	(7)	(8) %	(9)	(10)	(11)	(12) %	(13)	(14)	(15) %	(16)	(17) %	(18) %
Intralymphal.....	1	—	—	—	—	—	—	1	—	1	100	1	—	—	1	100	100
Intrajugular.....	136	38	27	43	3	46	34	45	7	52	39	88	21	24	67	79	49
Subcutaneous.....	10	—	—	1	—	1	10	8	1	9	90	9	5	56	4	44	40
Intrathoracal.....	10	—	—	—	—	—	—	6	4	10	100	6	3	50	3	50	30
Intramuscular.....	4	1	25	—	—	—	—	3	—	3	75	3	2	67	1	33	25
TOTALS.....	161	39	25	44	3	47	29	63	12	75	46	107	31	29	76	71	47

Table "B"

RESULTS of Intrajugular Injections arranged according to Material.

Material.	INJECTIONS.											TESTS.				Percentage of animals that survived the critical period of the test as compared to the total number of animals injected.		
	Number of animals injected.	Animals that contracted East Coast fever from injection						Animals that did not react typically to the injection					Total number of animals tested. (Cols. 5 & 9.)	Animals that contracted East Coast fever and died.			Animals that survived the critical period of the test.	
		and died.		and recovered,				and were exposed (Col. 13.)	and died before tests.	Total number of non-reactors. (Cols. 9 & 10.)	Per cent. of non-reactors. (Cols. 2 & 11.)	No.		Per-centage. (Cols. 13 & 14.)	No.		Per-centage. (Cols. 13 & 16.)	
		No.	Per-centage. (Cols. 2 & 3.)	and were ex-posed. (Col. 13.)	and died before tests	Total No. of re-coveries. (Cols. 5 & 6.)	Per cent. of re-coveries. (Cols. 2 & 7.)											
(1)	(2)	(3)	(4) %	(5)	(6)	(7)	(8) %	(9)	(10)	(11)	(12) %	(13)	(14)	(15) %	(16)	(17) %	(18) %	
Spleen and gland pulp (fine grain)..	7	1	14	2	1	3	43	3	—	3	43	5	1	20	4	80	71	
Spleen and gland pulp (coarse grain)	78	27	34	32	2	34	44	17	—	17	22	49	3	6	46	94	59	
Spleen pulp (coarse grain).....	45	10	22	9	—	9	20	22	4	26	58	31	15	49	16	51	34	
Spleen and gland pulp (medium grain)	4	—	—	—	—	—	—	1	3	4	100	1	—	—	1	100	25	
Gland pulp (fine grain).....	1	—	—	—	—	—	—	1	—	1	100	1	1	100	—	—	—	
Gland pulp (coarse grain).....	1	—	—	—	—	—	—	1	—	1	100	1	1	100	—	—	—	
TOTALS.....	136	38	27	43	3	46	34	45	7	52	39	88	21	24	67	76	49	

Table "C".

ABSTRACT OF RESULTS OF THE INTRAJUGULAR INJECTIONS in the different experiments, arranged according to the percentage of immunity conferred.

Experiment Number.	Number of Animals Injected.	Number of Animals that survived Tests.	Percentage of Immunity conferred.
3	2	2	% 100
13	4	4	100
24	8	7	87
22	4	3	75
23	6	4	66
21	30	19	63
17	5	3	60
18	6	3	50
19	6	3	50
20	18	8	44
15	7	3	43
14	3	1	33
9	10	3	30
11	4	1	25
4	4	1	25
16	4	1	25
6	5	1	20
7	2	—	Nil.
8	4	—	Nil.
32	3	—	Nil.
10	1	—	Nil.
TOTALS .. ..	136	67	49%

Table "D".

RESULTS arranged according to the "State" of the Material Injected.

State.	INJECTIONS.											TESTS.				Percentage of animals that survived the critical period of the test as compared to the total number of animals injected. (Cols. 2 & 16.)	
	Number of animals injected.	Animals that contracted East Coast fever from injection						Animals that did not react typically to the injection				Total number of animals tested. (Cols. 5 & 9.)	Animals that contracted East Coast fever and died.		Animals that survived the critical period of the test.		
		and died.		and recovered,				and were exposed. (Col. 13.)	and died before tests. (Col. 10.)	Total number of non-reactors. (Cols. 9 & 10.)	Per cent. of non-reactors. (Cols. 2 & 11.)		No.	Percentage. (Cols. 13 & 14.)	No.		Percentage. (Cols. 13 & 16.)
		No.	Percentage. (Cols. 2 & 3.)	and were exposed. (Col. 13.)	and died before tests. (Col. 13.)	Total No. of recoveries. (Cols. 5 & 6.)	Per cent. of recoveries. (Cols. 2 & 7.)										
(1)	(2)	(3)	(4) %	(5)	(6)	(7)	(8) %	(9)	(10)	(11)	(12) %	(13)	(14)	(15) %	(16)	(17) %	(18) %
Pulp (mixed with aleuronat).....	7	—	—	1	—	1	14	6	—	6	86	7	3	43	4	57	57
Pulp (mixed with peptone).....	52	20	39	19	1	20	39	12	—	12	22	31	3	10	28	90	54
Pulp—pure (unmixed).....	93	18	19	20	1	21	23	43	11	54	58	63	22	35	41	65	44
Pulp (mixed with various materials: glycerine, sand, etc.).....	9	1	11	4	1	5	55	2	1	3	34	6	3	50	3	50	33
TOTALS.....	161	39	25	44	3	47	29	63	12	75	46	107	31	29	76	71	47

Table "E".

RESULTS arranged according to "Duration of Infection" and "Course of the Disease" of the animal that supplied the material used for injection.

ORIGIN OF MATERIAL.		INJECTIONS.			TESTS.		
Duration of Infection.	Course of Disease.	Number of Animals Injected.	Number of Animals that contracted East Coast Fever from Injection,		Number of Animals Tested.	Number of Animals that contracted East Coast Fever from Tests and Died.	Number of Animals that survived the critical Period of the Test.
			and Died.	and Recovered.			
Days.	Days.						
21	8	2	—	—	1	—	1
22	9	7	—	—	2	—	2
23	8	4	3	—	1	—	1
25	14	4	—	1	4	—	4
25	14	5	2	3	3	—	3
25	15	3	2	1	1	—	1
26	15	4	2	—	1	—	1
27	19	6	3	2	3	—	3
28	15	2	—	1	2	—	2
Double	Injection	8	—	5	7	—	7
24	14	30	10	16	20	1	19
25	15	18	8	7	9	1	8
28	14	7	2	2	5	1	4
26	(?)	6	1	4	4	1	3
27	17	12	2	—	10	3	7
24	14	7	1	4	5	2	3
31	17	10	2	1	7	4	3
27	8	14	1	—	11	7	4
26	12	2	—	—	2	2	—
26	12	6	—	—	6	6	—
27	15	1	—	—	1	1	—
24	11	3	—	—	2	2	—
TOTALS ..	—	161	39	47	107	31	76

Table "F".

RESULTS arranged according to "Grain" of the Material Injected.

Grain.	INJECTIONS.											TESTS.					Percentage of animals that survived the critical period of the test as compared to the total number of animals injected. (Cols. 2 & 16.)	
	Number of animals injected.	Animals that contracted East Coast fever from injection						Animals that did not react typically to the injection					Total number of animals tested. (Cols. 5 & 9.)	Animals that contracted East Coast fever and died.		Animals that survived the critical period of the test.		
		and died.		and recovered,				and were exposed. (Col. 13.)	and died before tests.	Total number of non-reactors. (Cols. 9 & 10.)	Per cent. of non-reactors. (Cols. 2 & 11.)	No.		Percentage. (Cols. 13 & 14.)	No.	Percentage. (Cols. 13 & 16.)		
		No.	Percentage. (Cols. 2 & 3.)	and were exposed. (Col. 13.)	and died before tests.	Total No. of recoveries. (Cols. 5 & 6.)	Per cent. of recoveries. (Cols. 2 & 7.)											
(1)	(2)	(3)	(4) %	(5)	(6)	(7)	(8) %	(9)	(10)	(11)	(12) %	(13)	(14)	(15) %	(16)	(17) %	(18)	
Fine grain.....	8	1	12	2	1	3	38	4	—	4	50	5	2	33	4	67	50	
Coarse grain.....	143	38	27	42	2	44	30	55	6	61	43	97	28	29	69	71	41	
Chopped.....	3	—	—	—	—	—	—	2	1	3	100	2	1	50	1	50	33	
Medium grain.....	7	—	—	—	—	—	—	2	5	7	100	2	—	—	2	100	28	
TOTALS.....	161	39	25	44	3	47	29	63	12	75	46	107	31	29	76	71	47	



Table "G".

RESULTS arranged according to the Immunity shown by (1) Animals which contracted East Coast fever from injection and recovered; and (2) Animals which did not react typically to the injection.

	Number of Animals Tested.	Number of Animals that survived the critical Period of the Tests.	Number of Animals that died of East Coast Fever to the Tests.	Percentage of Immunity.
(A) Animals that contracted East Coast fever from the injection..	44	41	3	93
(B) Animals that did not react typically to the injection .. ..	63	35	28	56
TOTALS .. .. .	107	76	31	71

## SUMMARY OF CONCLUSIONS.

(1) The injection of spleen or gland pulp (of coarse or fine grain) into the jugular vein can be carried out with but little risk provided microscopical examination proves that such material is not contaminated with bacteria or micrococci.

(2) The presence of an *Endocarditis verrucosa*, due to the injection of such material, was only noted in one instance, and that was a case of a double injection into the jugular vein of 20 c.c. spleen pulp.

(3) The highest percentage of artificial infection, calculated on both deaths and immunity due to such injections, was obtained by the intrajugular method (*vide* Table A).

(4) Of the intrajugular injections, the most certain method of transmission was noticed after the injection of coarse-grained spleen pulp, and coarse-grained spleen and gland pulp (mixed) (*vide* Table B).

(5) The percentage of survivals amongst the animals treated by intrajugular injections, arranged according to the amount of material used, was as follows:—

In the dose of—

40 c.c.,	Nil	survived	out of 1	treated	— Nil.
25 c.c.,	2	„	„	7	„ 28 per cent.
20 c.c.,	13	„	„	41	„ 32 „
15 c.c.,	3	„	„	9	„ 33 „
10 c.c.,	16	„	„	31	„ 51 „
30 c.c.,	9	„	„	13	„ 70 „
5 c.c.,	24	„	„	34	„ 71 „

(6) The results of the intrajugular injections in the different experiments, arranged according to the immunity conferred, vary from nil to 100 per cent. (*vide* Table C).

(7) The highest percentage of transmission was obtained by the addition of peptone to the material injected (compare Table D).

(8) The material which transmitted the disease in the majority of cases was taken from cattle suffering from East Coast fever, which had been killed

from the 25th day onwards after the infestation of ticks, or fourteen days onwards after the first rise of temperature (*vide* Table E).

(9) The inoculation was either succeeded by (a) a typical East Coast fever reaction, ending in death, and accompanied with the presence of plasma bodies; or (b) by typical East Coast fever reactions, accompanied with parasites, and ending in recovery; or (c) by mild or irregular reactions, accompanied with the presence of parasites, and ending in recovery; or (d) by reactions indicative of East Coast fever, but without plasma bodies; or (e) by irregular reactions; or (f) by no reactions (*vide* Summary of Experiment and Tables).

(10) Of animals inoculated in various ways, and exposed to tick infestation or natural infection, the least mortality occurred amongst those which had shown plasma bodies in the lymphatic glands as a result of the injection (*vide* Table G).

(11) An observation of fundamental importance is the fact that an animal which contracted the disease from ticks (*viz.*, in the natural way) contracted it a second time and died when exposed to natural infection on the veld. In other words, animals which have recovered from a natural attack, due to tick infestation, may contract the disease again, although this seems to be a rare exception.

(12) A further fact of importance is the observation that five animals which contracted the disease from the injection, accompanied with the presence of plasma bodies in the lymphatic glands, and recovered, again contracted East Coast fever when exposed to natural infection, of which three died and two recovered.

(13) In the foregoing experiments, 224 animals were used in all, of which 180 were injected either once only, or twice within sixteen days, and forty-four were injected repeatedly.

- (a) Of the 180 animals, nineteen died, chiefly from accidents resulting from inoculation, the cause of death being septic pneumonia, due to embolism with contaminated material. Thirty-nine contracted the disease from the inoculation and died. Forty-seven contracted the disease from injection and recovered. Of these forty-seven, three died before they could be tested, three died of relapses, that is to say, again contracted the disease in the field (breakdowns in immunity), two showed relapses and recovered, and six died of other causes after the critical period of the test had elapsed. Twelve did not react typically to the injection, and died of other causes before they could be tested, or before the critical period of the test had elapsed. Sixty-three animals which did not react typically to the inoculation were tested by the infestation of ticks and exposure to natural infection; twenty-eight contracted the disease and died, three contracted the disease and recovered, and thirty-two proved to be immune. Of the thirty-five, eight died later of other causes.
- (b) Of the forty-four animals which were injected repeatedly, fourteen died, chiefly from accidents resulting from inoculation, the cause of death being septic pneumonia, due to embolism with contaminated material. Seven did not react typically to the injection, and died of other causes before they could be tested, or before the critical period of the test had elapsed. Twenty-three did not react typically to the injection, and were tested by the infestation of ticks or by exposure to natural infection, of which fifteen contracted East Coast fever and died, and eight proved to be immune; of these eight, two died later of other causes.

(14) The final result amongst the inoculated animals that were exposed to tick infestation and natural infection is:—

One hundred and thirty exposed, of which forty-six died of East Coast fever from tests, and eighty-five survived the critical period of the test, the net result of animals which survived injection and tests being eighty-four out of one hundred and seventy, or 50 per cent.

(15) For the present, a practical method of inoculation, which can be reasonably expected to confer immunity to the extent of 60 to 70 per cent., would consist in the injection of a quantity of not less than 5 c.c. of spleen or of a mixture of spleen and gland pulp (coarse grain) taken from an animal in the last stage of the disease, mixed with peptone and injected intrajugularly.

This method can be applied in all cases of emergency as a last resource, that is to say, in cases where there are no opportunities for dipping, or moving the cattle, the artificial immunization can be adopted in order to save the greatest possible number of animals.

## APPENDIX "A".

FURTHER HISTORY OF ANIMALS REFERRED TO IN THE ANNUAL  
REPORT OF THE GOVERNMENT VETERINARY BACTERIO-  
LOGIST FOR 1909-10.

The following table refers to the final history of the animals detailed in the previous report, and which at that time had not been tested :—

No. of Animal.	Annual Report, 1909-10, Page.	Final History.	Result.
458	45	Tested with ticks (Reference No. 153)	Killed on account of East Coast fever, 25th day.
923	45	Tested with ticks (Reference No. 153)	Killed on account of East Coast fever, 23rd day.
1016	47	See Experiment No. 2 N.....	Died at Burnside of East Coast fever.
1049	47	" " " 2 D.....	Still alive.
1032	47	" " " 7 F.....	Died of East Coast fever from ticks.
1031	47	" " " 7 G.....	Still alive.
1030	47	" " " 2 C.....	Died of poverty.
1029	47	" " " 6 C.....	Died of gangrenous pneumonia.
1048	47	" " " 7 A.....	Died of East Coast fever from ticks.
1038	47	" " " 7 C.....	Died of East Coast fever from ticks.
1043	47	" " " 2 F.....	Died of East Coast fever from ticks.
1039	48	" " " 7 B. ....	Died at Burnside of East Coast fever.
1027	48	" " " 6 H.....	Died of East Coast fever from ticks.
1025	48	" " " 8 G.....	Died of poverty at Burnside.
1050	48	" " " 4 G. ....	Died of East Coast fever from ticks.
1051	48	" " " 2 A.....	Died of gangrenous pneumonia.
1046	48	" " " 2 B.....	Died of East Coast fever from ticks.
1036	48	Killed on account of poverty..	—
1037	48	See Experiment No. 8 U.....	Died of East Coast fever.
1041	48	Killed on account of poverty..	—
1020	48	See Experiment No. 1 L.....	Died at Burnside of tick irritation.
833	48	" " " 1 B.....	Still alive.
896	48	" " " 1 C.....	Died of East Coast fever at Burnside.
1077	48	Died of anaemia.....	—
1064	48	See Experiment No. 8 Q.....	Killed on account of anaemia.
1066	48	" " " 1 E.....	Died at Burnside of heartwater.
1024	49	" " " 1 J.....	Died of poverty.
1023	49	" " " 8 P.....	Died of East Coast fever from ticks.
1042	49	" " " 2 E.....	Still alive.
911	49	" " " 1 M.....	Died of East Coast fever from ticks.
627	49	" " " 1 N.....	Died of East Coast fever from ticks.
1052	49	" " " 2 K.....	Died of poverty.
1035	49	" " " 6 J.....	Still alive.
831	49	" " " 1 A.....	Died of gangrenous pneumonia.
1071	49	" " " 1 F.....	Killed on account of poverty.
1068	49	" " " 1 K.....	Died of East Coast fever from ticks.
1014	49	" " " 1 D.....	Died of East Coast fever from ticks.
1045	49	" " " 8 V.....	Died of toxæmia.
1034	49	" " " 6 E.....	Still alive.