

on the seventeenth and twentieth days also gave negative results. Accordingly, although the temperature reaction resembled East Coast fever, no definite diagnosis was possible.

Immunity Test.—On the 10th May, 1910, this animal was tested on its immunity by the infestation of twelve brown nymphal ticks from English heifer 923 (reference number 268). The ticks were found attached the following day, and were collected fully engorged on the ninth day. On the 2nd July, 1910, ox 620 was infested with brown nymphae off East Coast fever cattle Nos. 923, 917, and 700 (reference numbers 268, 335, and 309). No reaction followed these infestations.

(4) *Heifer 882.*—Received from Schoombie, Cape Colony; two and a half years old.

Treatment.—On the 2nd March, 1910, 20 c.c. spleen pulp of ox 337 was injected into the spleen of heifer 882.

Result.—An irregular rise was noted during the few succeeding days, developing into a definite reaction later, and the animal died on the eighteenth day.

The examination of the blood proved negative. Examination of the prescapular glands showed the presence of plasma bodies, and on *post-mortem*, plasma bodies were found in all organs.

Post-mortem examination.

The condition was fair; rigor mortis was not present; the pleural cavities contained some yellowish liquid; the mediastinum was gelatinous; there were a few drops of liquid in the pericardium.

Lungs: Were not collapsed; the pleura of the middle lobe was whitish; fibrous filaments were noted; there was a very distinct oedema and gelatinous infiltration of the interstitium; the trachea was slightly injected and contained some foam; the bronchial lymphatic glands were slightly swollen and succulent; the mediastinal lymphatic glands were slightly swollen, anthracotic, and soft.

Heart: There were a few ecchymoses on the left endocardium; the ventricle was empty; the right endocardium was normal and contained a little food; the epicardium was normal.

Liver: Was slightly swollen, and of a light greyish colour; on section it had a saffron yellow appearance; there were a few patches with stasis of bile, and a few lobuli with commencing degeneration; the peritoneal lymphatic glands were slightly swollen; the bladder was slightly swollen and contained a greenish yellow bile.

Spleen: Measured 34 × 14 cm.; in the middle was a small abscess, the size of a nut, containing pus; there were a few thrombi in the vessels; the capsule was slightly yellowish; a few of the capillaries were injected; the follicles were not very distinct; the trabeculae were very distinct.

Stomach: The fourth stomach had liquid contents; the mucosa was swollen; the folds diffusely congested and strongly oedematous; the contents of omasum and rumen were dry.

Small intestines: The duodenum was slightly swollen, with a few red patches; the jejunum was slightly swollen and bile-stained; the ileum was slightly bile-stained and hyperaemic; Peyer's patches were swollen; the ileocaecal valve was discoloured.

Large intestines: There were bile-stained contents in the caecum and colon; a few nodules were present in the caecum, and its mucosa was swollen.

Mesentery: Showed sugillations.

Kidneys: Were dark in colour, friable; on section showed hyperaemic streaks; there were distinct injections of the glomeruli; the capsule was easily detached.

Cause of death: East Coast fever.

(5) *Heifer 885.*—Received from Schoombie, Cape Colony; about two and a half years old.

Treatment.—On the 2nd March, 1910, 10 c.c. spleen pulp of ox 337 was injected into the spleen of heifer 885.

Result.—An irregular temperature followed, during which *P. bigeminum* was noted to be rather frequent.

The animal died during the night of the fifteenth-sixteenth day, having had a slight temperature the previous three days. In this instance no small piroplasms were noted during the reaction. Plasma bodies were found in the spleen on *post-mortem*.

Post-mortem examination.

The condition was poor; the pleural cavities were filled with clear yellowish liquid; the pericardium contained 50 c.c. liquid.

Lungs: Had not collapsed; there was a strong oedema in both lungs; the trachea showed ramifications and oedema, and was filled with foam; the bronchi were filled with white foam; the bronchial and mediastinal lymphatic glands were swollen and infiltrated.

Heart: The left endocardium showed haemorrhages and ecchymoses; in the right endocardium were haemorrhages, ecchymoses, and petechiae; the myocardium was friable and discoloured; the epicardium showed ecchymoses and petechiae on the sulcus coronarius; the epicardium had a glazed appearance.

Liver: Was swollen, and of a reddish-yellow colour; on section it appeared yellowish-saffron; the bile was thick and greenish-yellow; the periportal lymphatic glands were yellowish, swollen, and infiltrated.

Spleen: Measured 42 × 14 cm.; the pulp was slightly dry; trabeculae were distinct.

Stomach: The fourth stomach was reddish in colour, and showed haemorrhagic infiltrations; the folds were swollen and hyperaemic; the omasum had dry contents.

Small intestines: The mucosa of the duodenum was slightly swollen, and was reddish discoloured; the mucosa of the jejunum was slightly swollen and reddish; a patchy hyperaemia was also noted; the vessels were injected; the mucosa of the ileum was swollen, the vessels were injected, and some petechiae were noted.

Large intestines: The caecum and colon were swollen, folded, and of a yellowish colour; haemorrhagic streaks were noted in the colon.

Kidneys: Were dark in colour; the glomeruli were distinct; the pelvis was gelatinous, and streaks were noted in the cortex; the capsule was easily detachable; the calix and hilus showed reddish infiltrations.

Cause of death: Acute East Coast fever.

(6) *Heifer* 884.—Received from Schoombie, Cape Colony; about two and a half years old.

Treatment.—On the 2nd March, 1910, 5 c.c. of spleen pulp of ox 337 was injected into the spleen of heifer 884.

Result.—During the first sixteen days, an irregular temperature occurred, and the frequent examination of the blood proved the presence of *P. bigeminum*.

From the eighteenth day a high temperature commenced. The animal was killed on the twenty-first day. The day previous, plasma bodies were found frequently in smears from the prescapular glands.

Post-mortem examination.

The condition was fair; the fat was of a yellowish colour; the subcutaneous tissue had a saffron-yellowish colour; the pericardium contained 10 c.c. clear liquid.

Lungs: Had not collapsed; the pleura of the middle lobe was whitish; a slight interstitial oedema was noticeable; on section there was distinct oedema; the trachea and bronchi contained yellowish foam; the mediastinal lymphatic glands were slightly swollen.

Heart: The left endocardium was normal; the blood was coagulated; the right endocardium was normal.

Liver: Was slightly swollen, and of a light-brownish colour with yellowish foci; on section it had a slight granular appearance; the lobuli were not very distinct; the gall bladder was contracted and the bile was thick; the periportal lymphatic glands were slightly swollen.

Spleen: Measured 45 × 13 cm.; the upper part showed fibrous tissue connected with the rumen; there was an abscess on the capsule; the veins were distended; the pulp was dark-red in colour and protruding on section; the trabeculae were very distinct.

Stomach: The fourth stomach contained some food; the mucosa was slightly oedematous.

Small intestines: The mucosa of the jejunum was slightly bile-stained and swollen, at of the ileum was covered with mucous; the ileo caecal valve was of a black colour.

Large intestines: The mucosa of the caecum was slightly swollen and showed black longitudinal streaks; some nodules were present; the colon was of a greenish colour, also showing longitudinal streaks and some nodules.

Kidneys: There was a small infarct in the left kidney, and one large one, of a light-brownish colour, in the right kidney.

Internal lymphatic glands: Were rather swollen; succulent and patchy haemorrhagic infiltrations of the sinuses were noted.

Marrow of bones: Normal.

Cause of death: (Killed) East Coast fever.

Summary of Results obtained from the Intrasplenic Injection of Spleen Pulp.

Of six susceptible animals injected with spleen pulp taken from animals which succumbed to East Coast fever, five contracted the disease, three of these dying as the result and the other two being killed *in extremis*; the sixth animal showed an atypical reaction, but proved immune when tested with infected ticks.

“ B ”—INJECTIONS OF LYMPHATIC GLAND JUICE.

(7) and (8) *Heifers* 912 and 608.

Two experiments were undertaken, one on the 2nd March, 1910, and the other on the 20th March, 1910. In both instances the animals died as a result of septicaemia.

“ C ”—INJECTIONS OF BLOOD.

(a) *Heifer* 923.

NOTE.—*Heifer* 923 contracted East Coast fever from ticks [*vide* Experiment I (f)].

(9) *Heifer* 1012.—About two and a half years old; received from Schoombie, Cape Colony.

Treatment.—On the 22nd March, 1910, 100 c.c. defibrinated blood of heifer 973 was injected into the spleen of heifer 1012.

Result.—No reaction followed. The blood was examined every other day, but with negative results. On the twenty-second and thirty-sixth days the examinations of the lymphatic glands were also negative. The reason for the last examination was the presence of a high reaction, which lasted for a few days, during which an examination of the blood was carried out daily with negative results.

NOTE.—This animal was used later for an intralymphal injection [*vide* Experiment III (36)]. Subsequently it was tested on its immunity by the infestation of infected brown nymphae and died twenty-nine days later of East Coast fever.

Results obtained from the Intrasplenic Injection of Blood.

The intrasplenic injection of blood taken from an animal infected with East Coast fever did not cause the experimental heifer to contract the disease; when tested later with infected ticks this heifer died of East Coast fever.

EXPERIMENT III.—INTRALYMPHAL INJECTIONS.

The positive results obtained by the injection of spleen pulp into the spleen suggested the inoculation of spleen pulp into the lymphatic glands.

For this purpose prescapular lymphatic glands were chosen. They were fixed between the fingers, and a needle with rather a large calibre was used. The observation was made that in lymphatic glands

of young animals, when the needle was inserted properly, lymphatic juice exuded, and in this way it was possible to control the operation. In older animals, however, no juice exuded, and, accordingly, we were not always certain whether the full injection reached the gland in every instance.

“ A ”—INJECTION OF SPLEEN PULP.

(a) *Spleen Pulp of Ox 337.*

NOTE.—Ox 337 contracted East Coast fever from the intrasplenic injection of spleen pulp [*vide* Experiment II (2)].

(1) *Ox 825.*—An aged beast; history unknown.

Treatment.—Injected on the 2nd March, 1910, into the right prescapular gland with 15 c.c. spleen pulp of ox 337.

Result.—No disturbance in the temperature was noticed for the first forty-five days, but after that a reaction ensued with typical remissions, during which the lymphatic glands were examined and the presence of plasma bodies noticed before piroplasms appeared in the blood.

These examinations were repeated until *P. parvum* was noted in the blood for the first time on the fiftieth day. They increased in numbers, and were very frequent at the time of death on the fifty-ninth day.

Examination of all internal organs on *post-mortem* revealed the presence of plasma bodies.

NOTE.—It is possible that the death of this animal was due to natural infection by stray ticks.

Post-mortem examination.

The condition was fair; the pericardium contained 400 c.c. liquid.

Lungs: Had not collapsed; the right lung showed hypostasis, and on section hyperaemia and oedema were noted; there were hyperaemic patches on the pleura; the trachea showed haemorrhagic infiltrations; the bronchial and mediastinal glands were swollen and showed gelatinous infiltrations.

Heart: The left endocardium showed haemorrhages, especially on the papillary muscle; the right endocardium showed imbibition; the myocardium was soft, and the epicardium showed ecchymoses.

Liver: Was considerably swollen and of a light-brown colour; on section it had a saffron appearance; the periportal lymphatic glands were swollen and the bladder was thickened; the bile was of a yellowish-green colour.

Spleen: Measured 55 × 15 cm.; in the upper part was a tumour containing blood coagulum; the pulp was dark in colour.

Stomach: The fourth stomach was distended and contained food; the mucosa was slightly swollen and showed numerous red spots and haemorrhages; the omasum had dry contents.

Small intestines: The ileum and jejunum were normal.

Large intestines: The mucosa of the caecum and colon were swollen and showed injection of vessels; some petechiae were also seen in the colon.

Kidneys: Were dark in colour and some large infarcts were noted in both kidneys.

Cause of death: East Coast fever.

(b) *Spleen Pulp of Ox 884.*

NOTE.—Ox 884 contracted East Coast fever from the intrasplenic injection of spleen pulp [*vide* Experiment II (6)].

(2) *Calf 879.*—Six months old; born at the Laboratory.

Treatment.—Injected on the 23rd March, 1910, with 20 c.c. spleen pulp of ox 884.

Result.—Directly after operation the temperature rose and remained high until death on the eighteenth day. The examination of the blood on two occasions showed the presence of *Piroplasma bigeminum*. No small piroplasms were noticed; the examination of the spleen on *post-mortem* showed the presence of rare plasma bodies.

Post-mortem examination.

Rigor mortis was not present; in the left prescapular lymphatic gland was a small abscess connected through a fistula with the skin; all serous membranes were rather pale; the pleural cavities contained a small quantity of liquid.

Lungs: Had not collapsed; the end part of the middle lobe was rather white in colour and gelatinous; the interstitial tissue was very distinct on section; a distinct infiltration was noted; foam and liquid dropped off the section; there was foam in the trachea; the mucous membranes of the trachea were slightly injected in a few places.

Heart: Was rather flabby; the ventricles were empty; the mediastinal lymphatic glands were slightly swollen.

Liver: Weighed 2.2 kilo.; it was swollen and of a light-bluish colour; the bile was thin, viscid, and green; the capillaries were injected; the periportal lymphatic glands were slightly swollen, and on section they showed a slight yellowish colour and were rather soft and granular.

Spleen: Measured 29 × 28 cm.; the capsule was rather dry and tough; a few fibrous filaments were noted; on section pulp protruded slightly; the follicles were rather small and trabeculae were very distinct.

Stomach: In the fourth stomach was a small quantity of contents; the mucosa was swollen; the pylorus showed a slight oedema and on the fold was a deep star-like ulcer; the omasum had dry contents.

Small intestines: There was a small quantity of slight bile-stained contents in jejunum; the mucosa was swollen and showed a few slight red patches.

Large intestines: The caecum had liquid green contents; the mucosa was slightly swollen; the capillaries showed a few ramifications; the colon was slightly swollen.

Kidneys: The surrounding tissue was considerably enlarged and oedematous; the left and right capsules were easily stripped off; whitish and reddish streaks were noted; in the medulla a few red points were noted; the pelvis was moist and oedematous; there was a small quantity of clear urine in bladder; the internal lymphatic glands were rather swollen and soft, and the right prescapular lymphatic glands presented a similar appearance.

Marrow of bones: That of the humerus was rather gelatinous, oedematous, and soft.

Cause of death: Acute East Coast fever.

Summary of Results obtained from the Intralymphal Injection of Spleen Pulp.

The intralymphal injection of spleen pulp taken from an ox which was infected with East Coast fever was followed by the appearance of the disease in the two experimental animals, both of which succumbed.

There is some doubt as to whether one of the oxen (No. 825) contracted the disease from this injection.

“ B ”—INJECTION OF LYMPHATIC GLAND JUICE.

(a) *Lymphatic Gland Juice of Ox 337.*

NOTE.—OX 337 contracted East Coast fever from the intrasplenic injection of spleen pulp [*vide* Experiment II (2)].

(3) *Ox 826.*—An aged beast; history unknown.

Treatment.—On the 2nd March, 1910, 10 c.c. of gland juice of ox 337 were injected into the prescapular glands of ox 826.

Result.—A definite incubation time of fourteen days was noticed, but the examination of the blood on alternate days gave negative results.

The fever lasted four days, when the animal died, no piroplasms having been found in the blood. The lymphatic glands were not examined.

Post-mortem examination.

The condition was fair; the pleural cavities contained some liquid; the mediastinum was gelatinous; the pericardium was injected and contained 1500 c.c. of clear yellowish liquid; the peritoneal cavities contained liquid; in the lumbal region were diffuse haematoma; in the prescapular fossa was a small abscess, the size of a nut, containing green pus; the membranes were of a blackish colour; the muscles were slightly degenerated and fibrous; the left prescapular gland was swollen, and measured $13 \times 5\frac{1}{2}$ cm.; on section it had a dark appearance, and a swelling of the medulla was observed; the left kneefold lymphatic gland was swollen, and there was a strong hyperaemia of the sinuses.

Lungs: Had not collapsed; the middle lobe of the pleura was whitish; the left lung showed hypostasis, and on section oedema and hyperaemia were noted; the trachea showed a slight injection.

Lungs: Had not collapsed; the middle lobe of the pleura was whitish; the left lung showed hypostasis, and on section oedema and hyperaemia were noted; the trachea showed a slight injection, and foam was present; the bronchi also contained foam; the mediastinal glands were swollen, anthracotic, and hyperaemic.

Heart: The left endocardium showed diffuse ecchymoses; the blood was coagulated; the haemolympathic glands were also swollen; the right endocardium also showed a few small ecchymoses; the myocardium was of a greyish colour and soft; the epicardium near the sulcus coronarius showed a few ecchymoses; the fat was partly gelatinous.

Liver: On section it was gritty; it was of a light-brown colour with distinct white foci and injection of the central veins; the periportal lymphatic glands were normal; the gall bladder was thickened and the mucosa showed ramifications; the bile was thin and of a greenish colour; the capsula glissoni showed fibrous gelatinous patches.

Spleen: Measured 58×20 cm.; it was slightly swollen and the margin was slightly rounded; there were fibrous filaments on the ventral part of the capsule; the pulp was soft; the follicles were not distinct; the trabeculae were distinct.

Stomach: The fourth stomach contained food; the mucosa was slightly swollen and the folds were oedematous; in the middle was an ulcer the size of a sixpence with star-like cicatrix and hyperaemia of tissue; there were also a few small ulcers with irregular edges; the reticulum was attached to the liver by gelatinous tissue; the omasum showed a few ramifications of the capillaries.

Small intestines: The mucosa of the duodenum was of a yellowish colour; there was one hyperaemic patch near the pylorus portion; the jejunum had bloodstained contents; its mucosa was swollen and showed patchy diffuse haemorrhagic infiltrations; some ecchymoses and suffusions were also noted; the ileum was slightly swollen, showing adherent mucus; the ileocaecal valve was yellowish and showed a few nodules with a capsule and greyish contents.

Large intestines: The mucosa of the caecum was slightly swollen and showed distinct ramifications of the capillaries, with a few irregular black streaks; the colon was also swollen, and irregular black patches were noted.

Kidneys: The parenchyma had a mottled reddish-white appearance; the cortex showed white and red streaks; the consistence was normal.

Bladder: Was distinct and contained clear urine.

Cause of death: Acute East Coast fever.

(c) *Gland Juice of Calf 884.*

NOTE.—Calf 884 contracted East Coast fever from the intra-splenic injection of spleen pulp [*vide* Experiment II (6)].

(4) *Calf 880.*—About seven months old; born on the station.

Treatment.—On the 23rd March, 1910, 1 c.c. lymphatic gland juice of calf 884 was injected into the prescapular gland of calf 880.

Result.—The next day an irregular reaction commenced, and on the twelfth and fourteenth days *P. bigeminum* were registered. Another slight irregular reaction followed, but no definite diagnosis was possible. *Piroplasma bigeminum* appeared again at a later date.

Immunity Test.—On the 10th May, 1910, this calf was tested on its immunity by the infestation of twelve brown nymphal ticks of heifer 923 (reference number 268). After an incubation time of

sixteen days the temperature rose and a reaction ensued, preceded by the presence of *Anaplasma marginale*.

At the end of the reaction small piroplasms appeared, which were identified with *P. parvum*. The animal died on the twenty-fourth day of East Coast fever.

(5) *Ox* 621.—An aged Africander.

NOTE.—Had previously been used for intraperitoneal injection of lymphatic glands [*vide* Experiment I (16)].

Treatment.—On the 23rd March, 1910, 5 c.c. lymphatic gland juice of ox 884 were injected into the lymphatic glands of ox 621.

Result.—An irregular temperature disturbance followed until the twelfth day, when a reaction commenced, reaching 105.2° E. on the evening of the fifteenth and sixteenth days. Puncture of the lymphatic glands on the seventeenth and twentieth days showed the presence of plasma bodies.

Immunity Tests.—The animal was tested on its immunity on the 10th May, 1910, by the infestation of twelve brown nymphae of heifer 923 (reference number 268). The ticks attached themselves and were collected again when engorged.

On the 2nd July, 1910, it was infested with brown nymphae off East Coast fever cattle 923, 917, and 700 (reference numbers 268, 335, and 309). No reaction followed these infestations.

(6) *Ox* 661.—A Cape Colony animal; eight years old.

NOTE.—Had previously been used for intraperitoneal insertion of lymphatic glands of bull calf 458 [*vide* Experiment I (17)].

Treatment.—On the 23rd March, 1910, 10 c.c. lymphatic gland juice of ox 884 was injected into the prescapular glands of ox 661.

Result.—Irregular temperatures were noted for the first few days, but from the fifteenth day a definite reaction commenced, during which the lymphatic glands were punctured and plasma bodies found to be present.

The animal died on the nineteenth day.

Post-mortem examination.

The condition was fair; rigor mortis was not present; there was an abscess in the muscle of the diaphragm the size of a child's hand; the surrounding tissue was fibrous and showed signs of a chronic inflammation; the lymphatic glands of the reticulum were attached to the diaphragm, and also a part of the spleen; the pericardium was injected and contained about 150 c.c. of clear yellowish liquid.

Lungs: Had not collapsed; the lobes were rather dark; the middle lobe of the pleura was white; there was hypostasis of the left lobe, which on section was oedematous; the mucous membrane of the trachea was swollen and showed ecchymoses and imbibition; there was a considerable amount of foam present; the bronchial and mediastinal lymphatic glands were small; there was a slight anthracosis and brown discolouration of the former; on section the parenchyma was of a dark-brownish colour.

Heart: There was a well-formed blood coagulum in the left ventricle; the endocardium was spotted with ecchymoses and suffusions; the right endocardium showed suffusions, petechiae, and ecchymoses; the epicardium along the sulcus coronarius was rather soft and showed ecchymoses and petechiae.

Liver: Was slightly swollen and of a light-bluish colour; on section it had a nutmeg appearance; decomposition had commenced; its consistence was soft; the bile ducts contained a dark-brown liquid.

Spleen: Measured 58 × 20 cm.; there were a few fibrous filaments on several places and a few injections of the vessels were noted; the pulp was protruding; the follicles were distinct and slightly swollen.

Stomach: The fourth stomach contained a small quantity of food; the mucosa was slightly swollen; the folds were gelatinous, oedematous, and showed diffuse red discolourations; the omasum had dry contents.

Small intestines: The duodenum was slightly discoloured and showed a few red patches; the vessels showed ramifications; the jejunum had a small quantity of bile-stained contents covered with green mucus; the vessels showed distinct injections and imbibition; the mucosa of the ileum was slate-coloured; Peyer's patches showed a few black spots.

Large intestines: The caecum had liquid contents; the mucosa was slightly swollen; there were diffuse ramifications of the vessels, and a few hyperaemic spots were noted; the mucosa of the colon was slate coloured and showed a few black spots.

Kidneys: Both kidneys were of a light-brown colour, spotted with small red rings surrounding the tubules; on section the cortex showed red and white streaks; the consistence was normal; the capsule was easily stripped off.

Cause of death: Acute East Coast fever.

(c) *Lymphatic Gland Juice of Ox 661.*

NOTE.—Ox 661 (see previous animal).

(7) *Calf 905.*—About six and a half months old; born at the Laboratory.

Treatment.—On the 12th April, 1910, 20 c.c. lymphatic gland juice of ox 661 was injected into the right and left prescapular glands of calf 905.

Result.—Some irregular temperatures followed for the first few days only.

Immunity Test.—On the 10th May, 1910, this animal was tested with twelve brown nymphae from heifer 923 (reference number 268) and again on the 11th May, 1910. After an incubation time of eleven days a typical reaction ensued, during which the lymphatic glands were punctured and the presence of plasma bodies demonstrated as well as *P. parvum* in the blood; the latter increased daily in numbers. The animal died on the thirty-third day after infestation of East Coast fever.

(d) *Lymphatic Gland Juice of Calf 917.*

NOTE.—Calf 917 was infested with ticks from calf 700 (reference number 309) and died on the fifteenth day. Plasma bodies were present in all internal organs on *post-mortem* examination. *P. parvum* was noticed in the blood during the last few days.

(8) *Ox 871.*—A Cape Colony animal; about one year old.

NOTE.—This animal had been used previously for an intraperitoneal insertion of lymphatic glands of calf 458 [*vide* Experiment I (14)].

Treatment.—On the 14th March, 1910, 1 c.c. of lymphatic gland juice of calf 917 was injected into the lymphatic glands of ox 871.

Result.—Some irregular temperature records were noticed during the first fourteen days, but the examination of the blood during this time and of the lymphatic glands on the thirteenth day gave negative results. Irregular temperature continued. No blood examinations were made.

Immunity Test.—On the 10th May, 1910, the animal was infested with twelve brown nymphae of heifer 923 (reference number 268). The ticks became attached, but no reaction ensued. The infestation was repeated on the 28th June with infested nymphae of cattle Nos. 923, 917, and 700. No reaction ensued.

(9) *Heifer 833.*—Received from Klipplaats, Cape Colony; about two and a half years old.

NOTE.—This animal had been used previously for intraperitoneal insertion of lymphatic glands of bull calf 458 [*vide* Experiment I (15)].

Treatment.—On the 14th April, 1910, 1 c.c. lymphatic gland juice of calf 917 was injected into the left prescapular gland of heifer 833.

Result.—No reaction followed.

NOTE.—This animal was used later for intralymphal injection of lymphatic gland juice of calf 897 [*vide* Experiment III (34)].

(10) *Heifer* 831.

NOTE.—Had been used previously for intraperitoneal injection of spleen pulp of cow 594 [*vide* Experiment I (7)].

Treatment.—On the 14th April, 1910, 1 c.c. of lymphatic gland juice of calf 917 was injected into the right prescapular gland of heifer 831.

Result.—No reaction ensued.

NOTE.—This animal was used later for an intrajugular injection of lymphatic gland juice [*vide* Experiment VI (8)].

(11) *Heifer* 896.—Purchased in the Transvaal; history unknown.

NOTE.—Had previously been used for subcutaneous injection of lymphatic glands of cow 677 [*vide* Experiment IV (2)].

Treatment.—On the 14th April, 1910, 1 c.c. lymphatic gland juice of calf 917 was injected into the left prescapular lymphatic gland of heifer 896.

Result.—An irregular temperature occurred, but the examination of the blood and lymphatic glands gave negative results.

NOTE.—Used later for intralymphal injection of lymphatic gland juice of calf 897 [*vide* Experiment III (35)].

(12) *Heifer* 897.—Purchased in the Transvaal; history unknown.

NOTE.—Had previously been used for infusion with blood of East Coast fever heifer 895, but with negative results.

Treatment.—On the 14th April, 1910, 1 c.c. lymphatic gland juice of calf 917 was injected into the left prescapular lymphatic gland of heifer 897.

Result.—No definite reaction ensued, and the examination of the blood and lymphatic glands gave negative results.

Immunity Test.—This animal was tested on its immunity by the infestation of twelve brown nymphae of East Coast fever heifer 923 (reference number 268) on the 10th May, 1910. After an incubation time of twelve days a reaction commenced, and plasma bodies were noted on the fifteenth day in the lymphatic glands. *P. parvum* appeared in the blood and increased daily. Plasma bodies, both gamogonous and agamogonous forms were present on the twenty-second day; the animal was killed on the twenty-fourth day.

(e) *Lymphatic Gland Juice of Ox* 825.

Ox 825 contracted East Coast fever from the intralymphal injection of spleen pulp of ox 337 [*vide* Experiment III (1)].

(13) *Heifer* 1016.—A Cape Colony animal; about one year old.

Treatment.—On the 30th April, 1910, 20 c.c. lymphatic gland juice of ox 825 was injected into the right and left prescapular glands of heifer 1016.

Result.—There was a slight reaction between the nineteenth and twenty-sixth days, and the examination of the blood showed the presence of *P. bigeminum*. Examination of the lymphatic glands on three occasions was negative.

NOTE.—This animal has not yet been tested on its immunity.

(f) *Lymphatic Gland Juice of Cow 596.*

NOTE.—Cow 596, an aged Africander animal, was infected on the 7th April, 1910, with East Coast fever ticks from heifer 923 (reference number 268). After an incubation time of fourteen days, a reaction was noted, and plasma bodies were found the following day. *P. parvum*, which was noticed in the blood, and the plasma bodies increased in numbers until the 4th May, 1910, when the animal was killed for experimental purposes.

(14) *Bull 1049.*—Obtained from the Transvaal; aged; history unknown.

Treatment.—On the 4th May, 1910, 5 c.c. lymphatic gland juice of cow 596 was injected into the right prescapular gland of bull 1049.

Result.—There was no noticeable reaction, but the lymphatic glands were examined on one occasion with negative results.

NOTE.—This animal has not yet been tested on its immunity.

(15) *Cow 1032.*—Obtained from the Transvaal; aged; history unknown.

Treatment.—On the 4th May, 1910, 1 c.c. lymphatic gland juice of cow 596 was injected into the right prescapular gland of cow 1032.

Result.—No reaction followed, and the examination of the lymphatic glands gave negative results.

NOTE.—This animal has not yet been tested on its immunity.

(16) *Ox 1028.*—Obtained from the Transvaal; aged; history unknown.

Treatment.—On the 4th May, 1910, 1 c.c. lymphatic gland juice of cow 596 was injected into the right prescapular gland of ox 1028.

Result.—A reaction commenced eighteen days later of an irregular character, and which was identified with the presence of *P. bigeminum*. On the twenty-first day the examination of the lymphatic glands proved the presence of plasma bodies, and in the blood small piroplasms were noted which, in the course of a few days, were diagnosed as *P. parvum*; *P. bigeminum* was present at the same time. On the 30th May, gamogonous forms of the plasma bodies were present in the lymphatic glands, and *P. parvum* increased in numbers in the blood. The animal died on the thirty-third day (7th June, 1910).

Post-mortem examination.

The condition was fair; the visible mucous membranes were pale and yellowish; the subcutaneous tissue was yellowish; the pericardium contained about 5 c.c. liquid.

Lungs: Had not collapsed; the pleura was pale and yellowish; oedema and hyperaemia were noted; the mucosa of the trachea was thickened; the bronchial and mediastinal lymphatic glands were swollen and showed slight anthracosis.

Heart: The left endocardium showed ecchymoses; the right endocardium was soft and friable.

Liver: Was of a yellowish-brown colour; on section of a saffron colour; the periportal lymphatic glands were swollen; the bile was thick and dark-green in colour.

Spleen: Considerably enlarged and swollen, measuring 58 cm. × 19 cm.; the pulp was soft and protruding; the trabeculae were indistinct.

Stomach: Mucosa was swollen; ecchymoses and oedema of folds were noted; the omasum had dry contents.

Small intestines: The mucosa of the jejunum and ileum were swollen and folded and showed hyperaemia.

Large intestines: The caecum was nearly empty; the mucosa of caecum and colon was folded and showed ecchymoses.

Kidneys: Were hyperaemic; the capsule was easily detachable; the hilus was gelatinously infiltrated.

Cause of death: East Coast fever.

(17) *Cow* 1031.—Obtained from the Transvaal; aged; history unknown.

Treatment.—On the 4th May, 1910, 1 c.c. lymphatic gland juice of cow 596 was injected into the right prescapular gland of cow 1031.

Result.—No reaction. The examination of the lymphatic glands on the 13th day gave negative results.

NOTE.—This animal has not yet been tested on its immunity.

(18) *Cow* 1030.—Obtained from the Transvaal; aged; history unknown.

Treatment.—Injected on the 4th May, 1910, into the right prescapular lymphatic gland with 2 c.c. lymphatic gland juice of cow 596.

Result.—No reaction. The examination of the lymphatic gland on the thirteenth day was negative.

NOTE.—This animal has not yet been tested on its immunity.

(19) *Cow* 1029.—Obtained from the Transvaal; aged; history unknown.

Treatment.—Injected on the 4th May, 1910, into the right prescapular gland with 2 c.c. lymphatic gland juice of cow 596.

Result.—No reaction; examination of the lymphatic glands gave negative results.

NOTE.—This animal has not yet been tested on its immunity.

(20) *Ox* 1048.—Obtained from the Transvaal; aged; history unknown.

Treatment.—Injected on the 4th May, 1910, into the right prescapular gland with 2 c.c. lymphatic gland juice of cow 596.

Result.—An irregular reaction followed, but the examination of the lymphatic glands gave negative results.

NOTE.—This animal has not yet been tested on its immunity.

(21) *Ox* 1038.—Obtained from the Transvaal; aged; history unknown.

Treatment.—Injected on the 4th May, 1910, into the right prescapular gland with 3 c.c. lymphatic gland juice of cow 596.

Result.—No reaction; and examination of the lymphatic glands were negative.

NOTE.—This animal has not yet been tested on its immunity.

(22) *Ox* 1043.—Obtained from the Transvaal; aged; history unknown.

Treatment.—Injected on the 4th May, 1910, into the right prescapular gland with 3 c.c. lymphatic gland juice of cow 596.

Result.—No reaction; and examination of the lymphatic glands were negative.

NOTE.—This animal has not yet been tested on its immunity.

(23) *Bull* 1039.—Received from the Transvaal; aged; history unknown.

Treatment.—Injected on the 4th May, 1910, into the right prescapular gland with 3 c.c. lymphatic gland juice of cow 596.

Result.—No reaction; and examination of the lymphatic glands were negative.

NOTE.—This animal has not yet been tested on its immunity.

(g) *Lymphatic Gland Juice of Ox 1018.*

NOTE.—Ox 1018, a Cape Colony animal, which contracted the disease from the infestation of four brown ticks from East Coast fever cow 592 [reference number 153 (c)]. Plasma bodies and *P. parvum* were traced for the first time on the nineteenth day, previous to which date the temperature had risen. The animal was killed on the 16th May, 1910, for experimental purposes.

(24) *Heifer 1027.*—Received from the Transvaal; about two years old; history unknown.

Treatment.—Injected on the 17th May, 1910, into the right prescapular gland with 10 c.c. lymphatic gland juice of East Coast fever cattle 1018.

Result.—An irregular reaction followed in no way typical for East Coast fever. The examination of the blood on the eighteenth day showed the presence of *Anaplasma marginale*.

NOTE.—This animal has not yet been tested on its immunity.

(25) *Ox 1025.*—Received from the Transvaal; aged; history unknown.

Treatment.—Injected on the 17th May, 1910, into the right prescapular gland with 8 c.c. lymphatic gland juice of East Coast fever ox 1018.

Result.—An irregular temperature ensued in no way typical for East Coast fever. On the thirtieth and thirty-first days the blood examination revealed the presence of *P. bigeminum*.

NOTE.—This animal has not yet been tested on its immunity.

(26) *Ox 1050.*—Received from the Transvaal; aged; history unknown.

Treatment.—Injected on the 17th May, 1910, into the right prescapular gland with 6 c.c. lymphatic gland juice of ox 1018.

Result.—A slight reaction ensued directly after the operation, but later the temperature became irregular. Blood examination revealed the presence of *P. mutans*, and at a later date *P. bigeminum*.

NOTE.—This animal has not yet been tested on its immunity.

(27) *Bull 1051.*—Received from the Transvaal; aged; history unknown.

Treatment.—Injected on the 17th May, 1910, into the right prescapular gland with 4 c.c. lymphatic gland juice of ox 1018.

Result.—No reaction followed. Blood examinations showed the presence of anisocytosis.

NOTE.—This animal has not yet been tested on its immunity.

(28) *Ox 1046.*—Received from the Transvaal; aged; history unknown.

Treatment.—Injected on the 17th May, 1910, into the right prescapular gland with 2 c.c. lymphatic gland juice of ox 1018.

Result.—An irregular temperature reaction was noted, and *P. bigeminum* appeared after a few days.

NOTE.—This animal has not yet been tested on its immunity.

(h) *Injections with Lymphatic Gland Juice of Heifer 928.*

NOTE.—Heifer 928, imported from England, contracted East Coast fever from the infestation of ticks. The course of the disease lasted twenty days.

(29) *Ox* 1036.—Received from the Transvaal; aged; history unknown.

Treatment.—Injected on the 17th May, 1910, into the right prescapular gland with 10 c.c. lymphatic gland juice of heifer 928.

Result.—No reaction.

NOTE.—This animal has not yet been tested on its immunity.

(30) *Ox* 1037.—Received from the Transvaal; aged; history unknown.

Treatment.—Injected on the 25th May, 1910, into the right prescapular gland with 10 c.c. lymphatic gland juice of heifer 928.

Result.—No reaction.

NOTE.—This animal has not yet been tested on its immunity.

(31) *Ox* 1041.—Received from the Transvaal; aged; history unknown.

Treatment.—Injected on the 25th May, 1910, into the right prescapular gland with 10 c.c. lymphatic gland juice of heifer 928.

Result.—No reaction.

NOTE.—This animal has not yet been tested on its immunity.

(32) *Ox* 1011.—A Cape Colony animal; about one year old.

Treatment.—Injected on the 25th May, 1910, into the right prescapular gland with 10 c.c. lymphatic gland juice of heifer 928.

Result.—An irregular reaction followed between the ninth and thirteenth days, when *P. bigeminum* was found. The reaction was not typical for East Coast fever.

Immunity Test.—On the 27th June, 1910, this animal was infested with brown nymphae of East Coast fever cattle 923, 917, and 700 (reference numbers 268, 335, and 309). A typical temperature reaction followed, and on the fifteenth day puncture of the lymphatic glands revealed the presence of a few agamogonous forms of *P. parvum*. The parasites appeared in the blood two days later, and increased in numbers until the animal was killed for experimental purposes on the twenty-first day, on which date plasma bodies were noted in the blood.

(33) *Ox* 1020.—A Cape Colony animal; about one year old.

Treatment.—Injected on the 25th May, 1910, into the right prescapular gland with 10 c.c. lymphatic gland juice of heifer 928.

Result.—Some irregular temperatures were noticed, but the examination of the blood proved negative.

NOTE.—This animal has not yet been tested on its immunity.

(i) *Lymphatic Gland Juice of Heifer 897*.

NOTE.—Heifer 897 was used for intralymphal injection of gland juice of calf 917 without contracting the disease, but was subsequently infested with infested East Coast fever ticks and killed *in extremis* [*vide* Experiment III (12)].

(34) *Heifer* 833.—Received from the Cape Colony; about two years old.

NOTE.—This animal had previously been used for the intraperitoneal injection of gland juice [*vide* Experiment I (15)] and also for an intralymphal injection of gland juice [*vide* Experiment III (9)], but did not contract East Coast fever.

Treatment.—Injected on the 3rd June, 1910, into the right prescapular gland with 5 c.c. lymphatic gland juice of heifer 897.

Result.—No reaction.

NOTE.—This animal has not yet been tested on its immunity.

(35) *Heifer* 896.—Received from the Transvaal; history unknown; about two years old.

NOTE.—This animal had previously been used for subcutaneous insertion of lymphatic glands of cow 677 [*vide* Experiment IV (2)] and for intralymphal injection of gland juice [*vide* Experiment III (11)], without contracting the disease.

Treatment.—Injected on the 3rd June, 1910, into the right preescapular gland with 5 c.c. lymphatic gland juice of heifer 897.

Result.—No reaction.

NOTE.—This animal has not yet been tested on its immunity.

(36) *Heifer* 1012.—Received from the Cape Colony; about two and a half years old.

NOTE.—This animal had previously been used for the intrasplenic injection of blood of East Coast fever heifer 923 without contracting the disease [*vide* Experiment II (9)].

Treatment.—Injected on the 3rd June, 1910, into the right preescapular gland with 5 c.c. lymphatic gland juice of ox 897.

Result.—An irregular record followed in no way typical for East Coast fever. Examination of the blood revealed the presence of *P. bigeminum*.

Immunity Test.—Tested on the 27th June, 1910, by the infestation of brown nymphae off East Coast fever cattle 923, 917, and 700 (reference numbers 268, 335, and 309). The ticks were fast the following day, and from the thirteenth day a typical East Coast fever reaction set in. Puncture of the lymphatic glands on the 12th July revealed the presence of agamogonous forms, and two days later *P. parvum* appeared in the blood. The parasites increased in number, and the animal died on the 29th day after infestation (26th July, 1910) from East Coast fever.

(37) *Heifer* 1077.—Received from the Transvaal; about two years old; history unknown.

Treatment.—Injected on the 3rd June, 1910, into the right preescapular gland with 5 c.c. lymphatic gland juice of ox 897.

Result.—No reaction.

NOTE.—This animal has not yet been tested on its immunity.

(38) *Cow* 1064.—Received from the Transvaal; about four years old; history unknown.

Treatment.—Injected on the 3rd June, 1910, into the right preescapular gland with 5 c.c. lymphatic gland juice of ox 897.

Result.—No reaction.

NOTE.—This animal has not yet been tested on its immunity.

(39) *Ox* 1066.—Received from the Transvaal; history unknown; aged.

Treatment.—Injected on the 3rd June, 1910, into the right preescapular gland with 5 c.c. lymphatic gland juice of ox 897.

Result.—No reaction.

NOTE.—This animal has not yet been tested on its immunity.

Summary of Results obtained from the Intralymphal Injection of Lymphatic Gland Juice.

Of thirty-seven animals which received an intralymphal injection of lymphatic gland juice taken from animals infected with East Coast fever, three contracted the disease and died; four gave atypical reactions and died of East Coast fever when tested with ticks; one gave an atypical reaction to the injection and proved immune when