

## SHEEP No. 10946.

History.	Particulars of P.M.	Macroscopical Changes.
<p>Expt. S. 1665; on 11.5.25. Splenectomised as normal animal.</p> <p>13.5.25. Died as result of splenectomy. <i>Vide</i> 11th and 12th Report, page 410.</p>	<p>P.M. on 14.5.25. P.M. No. 4533. Spec. No. 4945. Merino. Hamel. Full mouth. Condition good.</p>	<p><i>Skin, Left Iliac Region.</i>—Presence of an operation wound about 6 inches in length showing granulation.</p> <p><i>Peritoneum.</i>—Rumen adherent to the diaphragm by granulation tissue over the area where spleen was situated. The blood vessels in this region injected over an area of about 10 inches. Some of the severed vessels contain dark coagulated blood.</p> <p><i>Pathological Anatomical Diagnosis.</i>—Localized fibroplastic peritonitis; healing operation wound in left iliac region. Emphysema of mediastinum; slight hydropericardium. Fatty degeneration of myocardium; pneumonia (stage of engorgement); venous hyperaemia and fatty degeneration of liver; venous hyperaemia and slight fatty degeneration of kidneys. Absence of spleen.</p> <p><i>Etiology.</i>—Sequel splenectomy.</p>

## MICROSCOPICAL CHANGES.

*Liver:* Good deal of blood in the central part of the lobule with atrophy of the liver cells. Here and there liver cells are dislodged, and filled with a yellow pigment. The majority of the latter cells do not show the presence of nuclei. In the periphery of the lobule the liver cells show the presence of fat droplets. With Berliner Blue no haemosiderin detected whereas the cells referred to above stand out as very enlarged cells with yellow-brown pigment.

*Kidneys:* Localized necrosis chiefly of the tubuli contorti; hyperaemia.

This case was not satisfactory. For some unexplained reason the sections were not completed.

## SHEEP No. 7369.

History.	Particulars of P.M.	Macroscopical Changes.
<p>28.2.24. In Expt. S. 1602, splenectomised and followed by an acute reaction of Anaplasmosis. Killed on 19.3.24, in extremis for the collection of material.</p>	<p>P.M. on 19.3.24. P.M. No. 3581. Spec. No. 3844. Merino. Hamel. Full mouth. Condition rather poor.</p>	<p><i>Pathological Anatomical Diagnosis.</i>—Marked anaemia; slight icterus; enlargement and pigmentation of liver. Enlargement and pigmentation of some lymph glands; absence of spleen; slight localized fibrous peritonitis.</p> <p><i>Etiology.</i>—Killed in extremis as result of Anaplasmosis a sequel of splenectomy.</p>

## MICROSCOPICAL CHANGES.

*Liver:* Presence of numerous cells in the intralobular cavillaries. In places they form foci. These cells are spherical and contain a round nucleus. In the cytoplasm a golden-yellow pigment can be detected, i.e., the remains of erythrocytes. With Berliner Blue stain these cells stand out as bluish blotches, with a tendency to drift towards the central veins. There are also a good few neutrophils present. In view of these accumulations of cells the columns of liver cells have become distorted.

*Diagnosis:* Extensive desquamation of stern cells with erythrophagocytosis and haemosiderosis.

*Kidney:* In some glomeruli and interstitial blood vessels a few endothelials with haemosiderin could be detected. The epithelium of some of the tubuli stain a light diffuse blue colour.

*Lungs:* The blood vessels, i.e., the capillaries in the alveolar walls stand out as a bluish network, due to the presence of numerous endothelials containing granules of haemosiderin. With haemalum-eosin stain it would appear that in some of the endothelials the remains of erythrocytes could be identified.

*Periportal Lymph Gland:* Shows an increase of connective tissue elements in the stroma. With Sudan III the sinus cells stand out prominently, due to the presence of brick-red droplets. These cells are spherical, contain a large amount of cytoplasm and a fairly small spherical nucleus. With Berliner Blue stain the majority of these cells stand out as bluish blotches. There are also a good few eosinophiles present.

*Retropharyngeal Lymph Gland:* Similar picture. Note with Sudan III two types of pigment seen, (a) the main mass is of the nature of yellow-brown granules, and (b) the rest brick-red droplets. (a) With Berliner Blue stain shows up as haemosiderin. Few eosinophiles present.

*Mediastinal Lymph Gland:* Ditto retropharyngeal.

*Haemal Lymph Gland:* Extensive erythrophagocytosis in the sinus cells, and the remains of erythrocytes can actually be made out in the cytoplasm of these cells. Same staining affinities as seen in the retropharyngeal lymph gland.

*Myocardium*

*Skeletal muscle*

*Thyroids*

*Adrenals*

*Hypophysis*

} No abnormal pigmentation seen.

SHEEP No. 7443.

History.	Particulars of P.M.	Macroscopical Changes.
28.2.24. In Exp. S. 1602 splenectomised, followed by an acute reaction of Anaplasmosis, from which the animal succumbed on the 22.3.26	P.M. on 22.3.24. P.M. No. 3587. Spec. No. 3859. Merino. Hamel.	<i>Pathological Anatomical Diagnosis.</i> —Marked anaemia; slight icterus; hydropericardium; petechiae epicardium and endocardium; hyperaemia and oedema of lungs; pigmentation, swelling, and degeneration liver; swelling and hyperaemia of some lymphatic glands; swelling and pigmentation of other lymphatic glands. Absence of spleen; slight localised fibrous peritonitis. <i>Etiology.</i> —Anaplasmosis as a relapse after splenectomy.

MICROSCOPICAL CHANGES.

*Liver:* In the lobules between the columns of liver cells are accumulations of endothelials and the majority are packed with granular pigment. In some the contours of erythrocytes can be made out. Cells of the lymphoid series can also be made out in these foci. As a result of these lesions the columns of liver cells have atrophied. Some of the liver cells show the presence of fat droplets, especially those around the periphery of the lobule. In places there is a slight infiltration of Glisson's capsule with cells of the lymphocytic series.

*Kidneys:* Show no lesions.

*Lungs:* The capillaries show numerous desquamated endothelials with haemosiderin.

*Periportal Lymph Gland:* The sinus cells stand out prominently. They are made up of a good deal of cytoplasm with a small round nucleus. Sometimes the nucleus is horse-shoe shaped. The arrangement of the chromatin of these cells is less dense than the chromatin of the cells of the lymphoid tissue. Many of these sinus cells show the presence of a yellowish-brown pigment, which does not show up as haemosiderin with Berliner Blue stain. Some of them

show the presence of brick-red droplets with Sudan III, besides the yellowish-brown granules. These cells along the stroma occur as single rows, sometimes double, and sometimes more or less irregular in distribution.

*Mesenteric Lymph Gland:* Ditto.

*Retropharyngeal Lymph Gland:* Ditto, but the fat droplets in the sinus cells are less frequent.

## SHEEP No. 8430.

History.	Particulars of P.M.	Macroscopical Changes.
1.4.24. In Exp. S. 1602, showed no clinical changes after splenectomy. 15.9.24. In Exp. S. 1613 showed an acute reaction of Anaplasmosis. Died on 30.9.24 after extensive bleeding for another experiment.	P.M. on 1.10.24. P.M. No. 3282. Spec. No. 4444. Merino. Hamel. Two tooth. Condition fair to good.	<i>Pathological Anatomical Diagnosis.</i> —General anaemia; enlargement and hyperaemia of all lymphatic glands; slight oedema of the lungs; slight hydropericardium, absence of spleen; parasitic nodules in small and large intestines. P.M. changes fairly marked [the animal died unexpectedly]. <i>Etiology.</i> —Anaplasmosis and anaemia [as result of bleeding].

## SHEEP No. 8434.

History.	Particulars of P.M.	Macroscopical Changes.
19.3.24. In Exp. S. 1613 showed a reaction of Anaplasmosis after infection and recovered. 3.7.24. In Exp. S. 1602, splenectomised with acute relapse of Anaplasmosis, from which it succumbed ( <i>vide</i> 11th and 12th Report, page 476)	P.M. on 19.7.24. P.M. No. 3841. Spec. No. 4175. Merino. Hamel. Lamb. Condition fair.	<i>Pathological Anatomical Diagnosis.</i> —Marked anaemia; slight localised fibroplastic peritonitis; absence of spleen. Degeneration of liver and kidneys; slight hydropericardium. Oedema of lungs. <i>Etiology.</i> —Anaplasmosis as a relapse after splenectomy.

## MICROSCOPICAL CHANGES.

*Liver:* Extensive desquamation of stern cells with haemosiderosis; all liver cells show presence of minute brick-red droplets. Here and there (extremely rare) small foci seen, made up of loosened liver cells which are swollen and packed with fat droplets, some without nuclei. The small bile canaliculi are distended with bile.

Associated with the increase of stern cells there are numbers of round cells to be seen. Glisson's capsule in places shows large accumulation of round cells, of which many are of the lymphocytic type.

*Lungs:* Oedema and in the capillaries is a large number of endothelials packed with haemosiderin.

## SHEEP No. 10656.

History.	Particulars of P.M.	Macroscopical Changes.
3.11.25. In Exp. S. 2315, carrier of Anaplasma, splenectomised. 18.11.25. Killed by chloroform and bleeding during re- action of Anaplas- mosis.	P.M. on 18.11.25. P.M. No. 5092. Spec. No. 5591. Merino. Hamel. Full mouth. Con- dition good.	<i>Subcutaneous Connective Tissue.</i> —Large amount of fat. <i>Natural Openings.</i> —Somewhat pale. <i>Peritoneum.</i> —Fair amount of fat. The rumen is adherent by loose connective tissue to the diaphragm over an area from which the spleen was removed. <i>Left Lung.</i> —Echinococcus cyst. <i>Myocardium.</i> —Somewhat opaque. <i>Liver.</i> —Reddish brown appearance, lobulation distinct. <i>Spleen.</i> —Absent. <i>Small Intestine.</i> —Few parasitic nodules. <i>Large Intestine.</i> —Ditto. <i>Pathological Anatomical Diagnosis.</i> —Slight general anaemia; absence of spleen; localised fibrous adhesive peritonitis. Echinococcus cyst left lung. Parasitic nodules in small and large intestines. <i>Etiology.</i> —Killed by chloroform and bleed- ing.

## MICROSCOPICAL CHANGES.

*Liver:* Columns of liver cells show no alteration; here and there in the capillaries a few neutrophiles present in the form of small foci of about 10-15 cells. The liver cells here and there with Sudan III show the presence of minute fat droplets, rare and chiefly associated with the periphery of the lobule. With Berliner Blue here and there a stern cell with haemosiderin is found.

*Kidneys:* With Sudan III the convoluted portions assume a diffuse light brownish colour, but no pigment granules can be made out.

*Lungs:* No pigment cells seen when stained with Giemsa. The other stains were unsatisfactory.

*Retropharyngeal Lymph Glands:* Here and there a fair number of neutrophiles associated with the sinuses can be made out. With Sudan III most of the sinus cells show presence of golden-brown pigment, and brick-red droplets. With Berliner Blue stain sinus cells stand out prominently due to the fact that they are packed with golden-brown granular pigment. No haemosiderin seen.

*Mediastinal Lymph Glands:* Like Retropharyngeal except that with Berliner Blue stain a few desquamated endothelials with haemosiderin are encountered.

*Periportal Lymph Gland:* As Retropharyngeal. With Sudan III sinus cells stand out as a prominent brownish network between the bluish lymphoid tissue.

<i>Epiphysis</i> <i>Hypophysis</i> <i>Thyroids</i> <i>Adrenals</i> <i>Small intestine</i> <i>Large intestine</i>	} No lesions seen.
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## SHEEP No. 13853.

History.	Particulars of P.M.	Macroscopical Changes.
10.5.26. In Exp. S. 2523. Splenectomized on 21.5.26 and died on 8.6.26 as result of anaesthesia and $\frac{1}{2}$ Anaplasmosis.	P.M. on 8.6.26. P.M. No. 5506. Spec. No. 5978. Merino. Hamel. 4 tooth. Con- dition good.	<i>Pathological Anatomical Diagnosis.</i> —General anaemia. Hydraemia. General Icterus. Pigmentation liver and kidneys. Degeneration liver and kidneys. Absence of spleen. Degeneration of myocardium. Healing wound left iliac region. <i>Etiology.</i> —Died as sequel of anaesthesia and Anaplasmosis.

## MICROSCOPICAL CHANGES.

*Liver:* Columns of liver cells partly dislocated as result of the presence of endothelials filled with a brownish, irregular granular pigment. In places there are numbers of these cells lying free in the central veins. In places accumulations of these cells produce atrophy of the liver cells. The majority of the remaining liver cells show the presence of fat droplets of varying size. In places Glisson's capsule shows an increase of connective tissue and round cells. The blood vessels in Glisson's capsule are distended with blood. With Sudan III the pigment in the endothelials stain a yellowish-brown, whereas a few granules stain brick-red. With Berliner Blue the pigment appears to be of the nature of haemosiderin. There are some of the endothelials in the accumulations of cells described above which contain no pigment. In places there are a good many neutrophiles present.

*Diagnosis:* Fatty changes, proliferation, desquamation, and haemosiderosis of stern cells.

*Kidney:* The convoluted tubules with Berliner Blue stand out as diffuse blue structures. Here and there a few small dark blue granules can be made out in the epithelium. With Sudan III the affected tubules described show the presence of a fine granular pigment, which is brown in colour. Some tubules show the presence of minute fat droplets.

*Diagnosis:* Slight fatty infiltration and slight haemosiderosis.

*Lungs:* Numerous endothelials are encountered in small blood vessels (arterioles), as well as in the capillaries of the alveolar wall, filled with a golden yellow granular pigment. With Berliner Blue the greater part of the pigment is found to be haemosiderin. It stands out as bluish blotches in the capillaries, and small blood vessels, giving the lung a bluish network appearance. With Sudan III the granules stain greenish-yellow in which a few fat droplets can be also made out.

*Retropharyngeal Lymph Gland:* With Berliner Blue stain the cells of the sinuses are bluish in colour, due to the presence of haemosiderin. With Sudan III there is quite a number of brick-red droplets in the cells of the lymphoid tissue, whereas the cells of the sinuses stain a light yellowish-brown and stand out prominently.

*Renal Lymph Gland:* Note the cells of the sinuses stand out prominently, being packed with a greenish-brown granular pigment. The granules reach the size of red corpuscles; with Berliner Blue stain these sinus cells stand out as a bluish network with a tinge of green in contrast to the pink of the lymphoid tissue.

*Haemal Lymph Gland:* Resemble the changes observed in the Renal lymph gland. With Sudan III a number of these endothelials contain brick-red droplets, but the majority of these endothelials are filled with a brown pigment.

*Periportal Lymph Gland:* As Retropharyngeal.

*Mediastinal Lymph Gland:* As Retropharyngeal.

*Prescapular Lymph Gland:* Same brownish granular appearance of the sinus cells, but does not stain blue with Berliner Blue stain.

*Iliac Lymph Gland:* Like the prescapular, i.e., sinuses have a brownish tinge, but no trace of iron (haemosiderin) could be identified. With Sudan III a number of endothelials shows presence of brick-red droplets.

*Myocardium:* With Sudan III shows presence of minute droplets of brick-red colour, but these in no way obscure the cross-striations.

*Skeletal Muscle*

*Thyroid*

*Parathyroids*

*Epiphysis*

*Hypophysis*

*Small intestine*

*Rumen*

*Cerebrum*

*Tongue*

} No lesions detected.

Blood.	R.C.	W.C.	L.	M.	N.	Remarks.
17.5.26	13.2	8200	74	2	24	—
3.6.26	10.3	11200	50	7	43	Anaplasma frequent.
7.6.26	3.2	36800	46	20	43	Anaplasma frequent. Anisocytosis.
8.6.26	J. 2.6	52700	56	19	25	Anisocytosis. Anaplasma frequent.
	A. 2	38100	33	29	38	Slight Polychromasia. Few Normo-
	V.C. 2	53700	31	32	37	blasts. Jolly bodies.
	V.P. 2	46900	41	34	25	—

*Liver Smears:* (1) *Large cells* with an intensely stained basophilic cytoplasm, distributed as a ring around the nucleus. One such cell detected with a phagocytosed erythrocyte. The nucleus is round and somewhat leptochromatic. The cell reminds one of a lymphoblast (see Plate III). Does this type of cell, which may be regarded as a large Mononuclear, have a lymphoid origin? (c.f. Kiyono.)

(2) *Typical stern cells:* a few of these show erythrophagocytosis; the majority contain pigment granules.

(3) *Liver cells,* much vacuolated, probably due to the dissolution of fat droplets.

(4) *Free nuclei,* probably of parenchymatous origin.

(5) *Lymphocytes,* etc.

*Bone Marrow Smears:*

(1) Similar type of large cell (vide No. 1 liver smear). Erythrophagocytosis is also present (see Plate III). These cells are more of the nature of myeloblasts or lymphoblasts on account of the presence of nucleoli.

(2) *Endothelials* (like stern cells of the liver), showing erythrophagocytosis, vacuolation, and pigment granules (see Plate II).

(3) Regenerating forms of various types of leucocytes and erythrocytes.

*Lung Smears:*

(1) *Large endothelials* like stern cells with erythrophagocytosis, etc.

(2) Cells of the type (1) seen in the liver smear.

(3) *Lymphocytes and plasma cells,* i.e., with the round nucleus eccentrically placed and the cytoplasm intensely stained, except for a circular area medial to the nucleus, which is light rose-pink in colour. The size of the cell is about that of a medium-sized lymphocyte.

(4) Typical Monocytes as regards the character of their nuclei.

(5) Monocytes which are difficult to distinguish from large lymphocytes.

*Haemal Lymph Gland Smears:*

(1) Large cells as seen in liver smears (see Plate IV), some with erythrophagocytosis.

(2) Endothelials of the type of stern cells, vacuolated, pigment granules, etc.

*Retropharyngeal Lymph Gland Smears:*

(1) Lymphocytes and plasma cells.

(2) Blue cells, c.f. No. 1 of liver smears.

*Periportal Lymph Gland Smears:*

(1) Large number of plasma cells.

(2) Reticulum cells resembling the Gaucher type of cell.

(3) Endothelial cells of a type of stern cell with erythrophagocytosis.

*Renal Lymph Gland Smear:*

(1) Large number of blue cells (c.f. No. 1 liver cell).

(2) Plasma cells.

(3) Endothelials with erythrophagocytosis; this is of frequent occurrence.

(4) Monocytes with erythrophagocytosis.

*Kidney Smear:*

(1) Large blue cell (c.f. No. 1 liver cell with erythrophagocytosis). Has this drifted in with the circulation?

(2) Cells belonging to the epithelium of the tubules, with pigment granules.

(3) Monocytes, etc.

## SHEEP No. 8456.

History.	Particulars of P.M.	Macroscopical Changes.
14.5.24. In Exp. 1602. Splenectomized and showed no reaction. 26.6.24 in Exp. 1613 showed acute reaction of Anaplasmosis. Died as result of anaesthesia and internal haemorrhage, and sequel Anaplasmosis, on 11.7.24. <i>Vide</i> 11th/12th Report, page 461.	P.M. on 11.7.24. P.M. No. 3809. Spec. No. 4143. Merino. Hamel. Lamb. Condition good.	<i>Pathological Anatomical Diagnosis.</i> —Marked general anaemia (blood count 1.15 per cubic m.m.) Swelling of lymphatic glands, localized fibrous peritonitis, cicatrix on skin of left Iliac region; pigmentation of the lungs (brownish hue); pigmentation of kidneys; absence of spleen. <i>Etiology.</i> —Anaemia as result of internal haemorrhage (experimental), and Anaplasmosis, and effects of anaesthesia.

## MICROSCOPICAL CHANGES.

*Liver:* Shows very little alteration in connection with size, shape, and distribution of liver cells. Here and there a few cells without nuclei. Glisson's capsule stands out very prominently, is widened, and shows the presence of a large number of round cells, chiefly of the lymphoid series. There is no proliferation of bile ducts. With Sudan III and Berliner Blue no abnormal pigmentation. Liver smear shows no erythrophagocytosis.

*Kidneys:* Some of the blood vessels of the intermediary zone distended with blood. In some of the epithelial cells in the cortex, a yellow-brown granular pigment can be identified. Here and there in the lumen of the tubuli contorti a homogeneous material is seen, which stains a dirty blue colour.

*Lungs:* *N.B.*—A good many cells of the endothelial type containing haemosiderin granules. They are not infrequent and are associated with the capillaries. Does the lung function as regards an erythrophagocytosis, or are these cells brought in from other centres, other than the liver?

*Myocardium:* Shows in places the presence of brick-red droplets which are not infrequent. Few sarcocytes present besides fatty infiltration.

*Skeletal Muscle:* No. lesions seen.

*Bronchial Lymph Gland:* Blood vessels distended and with haemalum-eosin stain some of the sinus cells show yellow-brown pigment. Some show vacuoles which are fairly large.

*Retropharyngeal Lymph Gland:* With haemalum-eosin stain there can be made out here and there in the sinus cells yellow-brown granular pigment. The cell is of the nature of an endothelial and shows a good deal of cytoplasm with a horse-shoe shaped nucleus.

## SHEEP No. 8427.

History.	Particulars of P.M.	Macroscopical Changes.
19.3.24. In Exp. S. 1613, injected with infected blood: reaction of Anaplasmosis, recovered. 3.7.24 splenectomized; Acute relapse of Anaplasmosis which developed into a chronic case, and	P.M. on 18.11.25. P.M. No. 5093 Spec. No. 5592. Merino. Hamel. Full mouth. Condition good.	<i>Subcutaneous connective tissue.</i> —A fair amount of fat. <i>Liver.</i> —Shape and size nothing unusual. Reddish-brown colour. Lobulation distinct. Consistence nothing unusual. <i>Spleen.</i> —Absent. <i>Peritoneum</i> The rumen is adherent by loose connective tissue to the diaphragm over the position from which the spleen was removed. In this newly formed connective tissue are many haemal-

SHEEP No. 8427 (continued).

History.	Particulars of P.M.	Microscopical Changes.
lasted up to 18.11.25 when killed by chloroform and bleeding for collection of specimens. See page 469, 11th and 12th Reports D.V.E. & R. South Africa for Haematological study.		lymph glands irregularly scattered, up to a few millimetres in diameter. The rest of the peritoneum is smooth and glistening. The haemolymph glands along the course of the abdominal aorta are numerous and prominent. <i>Small and large intestines.</i> —Few parasitic nodules present (Oesophagostomum). <i>Other Organs.</i> —Nothing unusual. <i>Pathological Anatomical Diagnosis.</i> —Absence of spleen. Localized fibrous adhesive peritonitis. <i>Etiology.</i> —Killed by chloroform and bleeding.

## MICROSCOPICAL CHANGES.

*Liver:* With haemalum-eosin Glisson's capsule is very prominent in places as result of round cell infiltration, chiefly made up of cells of the lymphoid series. Only slight increase of fibrillae and practically no proliferation of bile duct epithelium. The intralobular capillaries here and there show the presence of round cells with a sprinkling of neutrophiles. The central veins are distended with blood and also contain endothelials, which with Berliner Blue stain show the presence of haemosiderin. Similar cells are also encountered in the capillaries around the central vein.

*Kidney:* No lesions seen.

*Lungs:* Show endothelials with haemosiderin almost as frequent as in the liver. In connection with the pigment observed in the capillaries of the lung it is difficult to say whether the endothelials of the capillaries of the alveolar wall phagocyte degenerated erythrocytes, or whether all the phagocytes seen in the lung are Reticulo-endothelial cells. It is not clear whether many of these phagocytes, brought to the lung, disintegrate in the capillaries and so set free the pigment. No free pigment is seen, but this pigment may be soluble when it is set free from the phagocyte. At all events it would appear from the study of the lung smears that these phagocytes in the lung resemble stern cells. From the number of phagocytes present in the liver and in the lung respectively, it gives one the impression that the lung is not only fed by the Reticulo-endothelial cells of the liver (c.f. sheep 8456). Moreover, from the absence, or on account of the few phagocytes occurring in other organs fed indirectly by the pulmonary artery, one would be inclined to conclude that these cells disappear in the lung, yet when we compare the counts of internal circulation, i.e. the counts from the vena cava and aorta very little difference in the number can be detected.

*Iliac Lymph Glands:* With Berliner Blue stain the sinus cells show the presence of a yellow-brown pigment, whereas with Sudan III many cells show the presence of brick-red droplets. A few neutrophiles and eosinophiles are present.

*Retropharyngeal Lymph Glands:* Ditto.

*Periportal:* Ditto.

*Mediastinal:* Ditto.

*Myocard*

*Skeletal Muscle*

*Large Intestine*

*Small Intestine*

*Pancreas*

*Adrenals*

*Cerebrum*

*Cerebellum*

*Skin*

No lesions seen.

## SHEEP No. 8457.

History.	Particulars of P.M.	Macroscopical Changes.
15.5.24. In Exp. S. 1602. Splenectomized and showed no reaction. 30.6.24 in Exp. S. 1613 showed reaction of Anaplasmosis after the injection of blood. See page 459, 11th and 12th Reports.	P.M. on 16.9.24. P.M. No. 3276. Spec. No. 4349. Merino. Hamel. Aged. Condition good.	<i>Pathological Anatomical Diagnosis.</i> —Anaemia; absence of spleen; parasitic nodules in small and large intestines; apparent hypertrophy of the haemal-lymph glands. <i>Etiology.</i> —Animal killed during a reaction of Anaplasmosis for the collection of material.

## MICROSCOPICAL CHANGES.

*Liver:* Shows a fair amount of blood in the capillaries, chiefly towards the periphery. Here and there desquamated stern cells seen with yellow-brown pigment (haemosiderin). Here and there Glisson's capsule stands out prominently, due to presence of fibrillae and round cells.

*Kidneys:* Good deal of blood in the blood vessels.

*Lung:* A good deal of blood in the capillaries of the lung. Haemosiderosis not infrequent in desquamated cells of the lung capillaries.

*Lymph Glands:* Here and there a cell with yellow-brown pigment.

## SHEEP No. 8432.

History.	Particulars of P.M.	Macroscopical Changes.
5.4.24. In Exp. S. 1613 showed a reaction of Anaplasmosis after the injection of infected blood. Was killed on 2.5.24 during the reaction for the collection of material.	P.M. on 2.5.24. P.M. No. 3673. Spec. No. 4002. Merino. Hamel. Condition good.	<i>Pathological Anatomical Diagnosis.</i> —General Anaemia; enlargement of many lymph glands; hyperplasia of lymph follicles in spleen; numerous <i>Haemonchus contortus</i> in stomach; parasitic nodules in intestines. Haematoma in liver. <i>Etiology.</i> —Killed during an Anaplasma reaction.

## MICROSCOPICAL CHANGES.

*Liver:* The cells do not stain uniformly, but their contour and arrangement in columns show nothing unusual. A few cells show presence of two nuclei and a few liver cells are without nuclei. Note complete absence of any evidence of pigmentation.

*Kidney:* Note the absence of a few nuclei here and there. The medullary zone shows the blood vessels crammed with erythrocytes.

*Periportal Lymph Gland:* In the lymphoid strands a good few eosinophiles can be detected. Very little alteration observed in the sinuses and stroma.

*Mesenteric Lymph Gland:* Fair number of eosinophiles present in the lymphoid tissue. No evidence of iron pigment, but with Sudan III here and there a few cells in the stroma filled with a brownish granular pigment.

*Retropharyngeal Lymph Gland:* The sinuses in places crowded with neutrophiles. With Sudan III the same pigment is seen as described for Mesenteric lymph glands.

*Spleen:* No changes seen.

*Bone marrow:* Few cells of the reticulum filled with a brownish granular pigment.

Other organs, i.e. lung, thyroid, etc., show nothing unusual.

SHEEP No. 8463.

History.	Particulars of P.M.	Macroscopical Changes.
21.5.24. In Exp. S. 1613 showed a reaction of Anaplasmosis after the injection of infected blood. Was killed on 14.6.24 during reaction for the collection of material.	P.M. on 14.6.24. P.M. No. 3263. Spec. No. 4107. Merino. Hamel. 4 years. Condition good.	<i>Pathological Anatomical Diagnosis.</i> —Fairly extensive general anaemia; foci in the liver. Slight tumour splenis and hypertrophy of the lymph follicles in the spleen. Parasitic nodules in small and large intestines. <i>Etiology.</i> —Killed during Anaplasmosis reaction.

**MICROSCOPICAL CHANGES.**

*Liver:* Numerous small foci present in the lobules, some lobules contain two such foci. They are made up of round cells with a few neutrophiles. In some foci there are more neutrophiles present, giving the impression of a small abscess. In places along the periphery of the foci there are evidences of necrobiosis. Blood vessels contain a good deal of blood. The liver cells show slight fatty changes. No abnormal pigmentation. The lesions described are probably of the nature of a complication (e.g. Paratyphoid)?

*Kidney:* No lesions detected.

*Spleen:* Large quantity of blood in the sinuses and haemosiderin in the Reticulo-endothelial cells of the pulpa. Note that the eosinophile granules with Sudan III stain an intense brick-red colour. There is a fair number of eosinophiles present.

*Controls.*

SHEEP No. 13994. SPECIMEN No. 5994.

*To Control:* Microscopical appearances. Killed by Anaesthesia and Bleeding.

*Liver:* Presence of a few fat droplets in liver cells. With Berliner Blue no pigment could be identified.

*Kidneys:* Slight engorgement of the blood vessels in the medulla.

*Lungs:* With Berliner Blue stain no pigment cells could be identified.

*Spleen:* With Berliner Blue no haemosiderin or other pigment could be identified. It was restained with the same result. With Sudan III stain cells of the pulpa show the presence of fairly large granules of a brick-red colour. These cells lie in between the lymphoid tissue. In this section there seems to be an absence of blood debris in the spleen.

*Lymph Gland (not identified):* Good few eosinophiles detected. With Sudan III the granules of these eosinophiles stain reddish-brown and stand out prominently. With Berliner Blue stain no pigment could be made out.

*Renal Lymph Gland:* Lymphoid tissue stands out very prominently. A fair number of eosinophiles present. With Berliner Blue stain here and there sinus cells with a yellow-brown pigment. Associated with the stroma in the lymphoid tissue (strands and follicles) are large endothelials filled with reddish-brown granules.

*Periportal Lymph Gland:* Few eosinophiles observed. With haemalum-eosin a few sinus cells are seen with golden-brown pigment. With Sudan III these cells stand out more prominently, due to the presence of reddish-brown granular pigment.

*Pectoral Lymph Gland:* Haemalum-eosin stained sections show sinus cells with yellow-brown pigment. With Berliner Blue stain the pigment assumes a similar colour.

*Iliac Lymph Glands:* Eosinophiles not infrequent in lymphoid tissue and sinuses. With Sudan III there are large cells around the blood vessels in whose cytoplasm large amounts of yellowish-brown and reddish-brick granules can be identified.

*Mediastinal Lymph Gland:* Fair number of eosinophiles present. With Sudan III here and there sinus cells with reddish-brown pigment.

*Retropharyngeal Lymph Glands:* In the sinus cells towards the periphery are seen irregular brownish granules when stained with haemalum-eosin. With Sudan III these granules stain reddish-brown. Few eosinophiles present.

*Prepectoral Lymph Glands*: Only a few sinus cells with yellowish-brown granular pigment. With Sudan III here and there masses of a brick-red colour, probably fat (like a conglomeration of droplets). Here and there eosinophiles with reddish-brick granules.

*Haemal Lymph Gland*: Besides a good deal of blood present, a fair number of eosinophiles could be identified. With Sudan III here and there cells with a light yellowish pigment not distinct.

*Endocrine organs and other organs*: No pigmentation encountered.

SHEEP No. 13994. NORMAL.

*Liver Smears*: (1) Free nuclei.

(2) Liver cells.

(3) Cells of the type of lymphocytes with dark chromatin stained granules in the cytoplasm on one side.

(4) Monocytes.

(5) Stern cells with light greyish-blue irregular cytoplasm and much larger than monocytes.

*Lung Smears*: (1) Endothelials.

(2) Lymphocytes with granules as above.

*Bone Marrow Smears*: Normoblasts. Erythroblasts.

*Mediastinal Lymph Gland*: (1) Large dark blue cells with leptochromatic nucleus: endothelial or lymphocyte? These cells sometimes encountered in the blood. (c.f. Plate I.)

(2) Lymphocytes.

(3) Free nuclei.

(4) Few monocytes.

*Renal Lymph Gland Smears*: (1) Blue cells: endothelial or lymphocyte (?)

(2) Lymphocytes.

(3) Lymphocytes (?): plasma cells.

(4) Good few eosinophiles.

(5) Free nuclei.

(6) Endothelials.

*Kidney Smears*: (1) Free nuclei, probably from epithelium of tubules.

(2) Few monocytes.

(3) Neutrophiles.

(4) Lymphocytes, some with granules.

*Spleen Smears*: (1) Monocytes.

(2) Eosinophiles not infrequent.

(3) Lymphocytes, some with granules.

(4) Cells larger than lymphocytes and monocytes with an intense basophilic cytoplasm, and a nucleus leptochromatic in character.

Are these endothelials or lymphocytes?

(5) Numerous free nuclei.

(6) Complete absence of cells, showing erythrophagocytosis.

SHEEP No. 10246. SPECIMEN No. 6171.

*Control*: Microscopical appearances. Killed by anaesthesia (chloroform).

*Liver*: Chronic cholecystitis associated with *Stilesia hepatica*. Here and there in the liver cells are to be seen not many small to medium sized fat droplets. With Berliner Blue stain no trace of haemosiderin.

*Kidneys*: No lesions.

*Lung*: Here and there an isolated endothelial cell with brown pigment; also a few cells with brick-red granules.

*Spleen*: Little haemosiderin present in the pulpa. Nothing detected with Sudan III.

*Preascapular Lymph Glands (E)*: With haemalum-eosin numerous sinus cells with yellow-brown pigment, and in some, this pigment is present in large quantities. In the follicles here and there masses of brick-red droplets when stained with Sudan III, whereas the pigment in the sinus endothelials is of a yellow-brown colour. There are many cells which also contain a brick-red pigment. With Berliner Blue stain the pigment in the sinus cells stands out as a yellow-brown.

*Mesenteric Lymph Gland (D)*: With haemalum-eosin large number of endothelials with yellow-brown granular pigment, some of the cells are very large. The majority of these cells with Sudan III show the presence of brick-red droplets. With Berliner Blue stain the endothelials show the presence of yellow-brown pigment.

*Periportal Lymph Glands (A)*: Ditto, but the cells with pigment are less frequent.

*Haemal Lymph Gland*: Here and there an endothelial seen with yellow-brown pigment.

*Renal Lymph Gland (C)*: like haemal lymph gland.

*Mediastinal Lymph Gland (G)*: like Mesenteric, except that pigment stained with Sudan III is more in evidence.

*Retropharyngeal Lymph Gland (H)*: Ditto.

*Iliac Lymph Gland (F)*: Ditto.

*Liver Smears*: Liver cells. Monocytes, etc.

*Lung Smears*: Monocytes. Endothelials. Lymphocytes (?), some with granules. Few eosinophiles, etc.

*Bone Marrow Smears*: Fair amount of blood. Many cells of the eosinophile group.

*Mesenteric Lymph Gland*: (1) Lymphocytes and lymphoblasts.

(2) Monocytes.

(3) Few eosinophiles.

(4) Endothelials with vacuoles, but no sign of erythrophagocytosis.

SHEEP No. 13856. SPECIMEN No. 6172.

*Control*: Microscopical appearances. *Killed by Bleeding*.

*Haemal Lymph Glands*: At post-mortem were very prominent and numerous.

*Liver*: Macroscopically showed degenerated liver cysts. *Microscopically* here and there a few fat droplets discerned in the liver cells. With Berliner Blue no iron detected.

*Kidneys*: With Sudan III many of the convoluted tubules show a faint brownish colour. Cytoplasm has a granular appearance.

*Lung*: With Berliner Blue, Sudan III, and haemalum-eosin stains no abnormal pigmentation detected.

*Spleen*: With Berliner Blue only here and there a few cells detected in the pulpa, showing the presence of Haemosiderin.

*Periportal Lymph Gland (A)*: A homogeneous network of a brick-red colour detected in the sinuses, but not present in the cells. No pigment seen with Berliner Blue and haemalum-eosin stains.

*Mediastinal Lymph Glands (B)*: No pigment detected with the three stains.

*Prescapular Lymph Gland (C)*: Ditto.

*Retropharyngeal Lymph Gland (D)*: Large number of sinus cells with the Sudan III stain shows the presence of brick-red granules. With Berliner Blue stain the pigment is yellow-brown.

*Mesenteric Lymph Gland (H)*: Here again in the sinuses a homogeneous material in the form of a brick-red network. No pigment in the cells.

*Renal Lymph Gland (F)*: No pigment granules seen.

## APPENDIX II.

This deals with the macroscopical and microscopical changes observed in sheep affected with Enzootic Icterus.

SHEEP No. 9228.

Particulars of P.M.	Macroscopical Changes.
P.M. on 18.8.24 P.M. No. 3939. Spec. No. 4249.	<i>Pathological Anatomical Diagnosis.</i> Hyperaemia and slight oedema lungs. Pigmentation liver. Pigmentation kidneys. Marked enteritis. <i>Etiological Diagnosis.</i> Enzootic Icterus.

### MICROSCOPICAL CHANGES.

*Liver*: Here and there round cell infiltration in Glisson's capsule. Pigment cell formation present in Glisson's capsule (Reticulum cells). Marked desquamation and pigmentation of Reticulum cells in the lobule, especially around the central veins, with atrophy of liver cells. In the canaliculi good

deal of bile pigment (yellowish-green), especially in the periphery. Fair number of neutrophiles present, also a few eosinophiles. The liver cells in the columns dislodged. The sizes of the nuclei vary, some very large. Some liver cells without nuclei. The freed pigment cells show up well with Sudan III stain. No Haemosiderin.

*Kidney*: Extensive haemosiderosis in the epithelium of the tubuli in the cortex, giving it a bluish appearance. In some of the lumen of the tubuli a homogeneous bluish material present. Haemoglobin is less extensively present in the cortex than in the medula. Here and there the tubular epithelium shows the presence of brick-red droplets with Sudan III. This is not frequent.

*Lung*: With Berliner Blue fairly extensive haemosiderosis shown, but this pigment not of the nature of big masses (as seen in lungs of splenectomy cases), but more of the nature of fine granules, and some of the endothelials present a diffuse blue colour. Is this Haemosiderin from the lymphatic system, or from the rest of the Reticulo-endothelial apparatus (with the liver excluded), or has the freed Haemoglobin undergone disintegration in the Lung? With Sudan III the capillaries show a fair number of cells which stain brown. This is due to the presence of granules which are more or less evenly distributed. This brown pigment is not the colour of Haemosiderin when using Sudan III stain, but resembles the pigment cells described in the liver.

*Spleen*: Good deal of blood present in the sinuses. Well marked haemosiderosis associated with the pulpa.

*Lymph Gland*: No. 1. Fairly well marked haemosiderosis in the sinus cells; fairly evident pigment accumulations in the reticulum cells of the lymphoid tissue.

*Lymph Gland*: No. 2. Haemosiderosis in sinus cells. *N.B.*—Numerous brown granular pigment cells, the same as described in Glisson's capsule, in the reticulum of the lymphoid tissue. With Sudan III the pigment is not of the nature of fat, and does not dissolve out when treated with alcohol. Their distribution is very characteristic and mainly associated with the cortical lymphoid tissue.

With haemalum-eosin they stain light reddish-brown.

*Adrenals*  
*Myocardium* } No lesions seen.

SHEEP No. 11700.

<i>Particulars of P.M.</i>	<i>Macroscopical Changes.</i>
P.M. on 25.4.25. P.M. No. 4662. Spec. No. 4912. Merino Hamel. Full mouth. Condition good.	<p><i>Blood</i>.—Not coagulated, watery, brown-red colour, does not stain well.</p> <p><i>Lymph Glands</i>.—Enlarged, on section moist and brown in colour.</p> <p><i>Lungs</i>.—Diffuse brown-red colour, etc.</p> <p><i>Liver</i>.—Lobulation distinct; central vein distended; rest of liver lobule is greenish-yellow in colour; consistence very soft and friable.</p> <p><i>Gall Bladder</i>.—Markedly distended with a greenish-black bile; mucous membrane greenish discoloured.</p> <p><i>Kidneys</i>.—Capsule easily detached, leaving a bluish-black surface; edges on section everted; zones not distinct; whole cut surface gives a granular black appearance, striations in cortical zone just visible; friable.</p> <p><i>Caecum</i>.—Large masses of faeces of the size of hen's egg, dry, glistening and hard.</p> <p><i>Bladder</i>.—Dark red, almost black urine.</p> <p><i>Pathological Anatomical Diagnosis</i>.—Marked general icterus, pigmentation, oedema and hyperaemia lungs; swelling and pigmentation liver; marked tumour splenis; haemoglobinaemia; haemoglobinuria; marked pigmentation and degeneration kidneys; constipation of ansa proximalis; extensive parasitic infection of intestines.</p> <p><i>Etiology</i>.—Enzootic Icterus.</p>

#### MICROSCOPICAL CHANGES.

*Liver*: Few pigmented reticulum cells in Glisson's capsule. Here and there slight round cell infiltration. Pigment cells frequent around central vein with atrophy of the liver cells. Bile pigment present in the distended canaliculi. No Haemosiderin detected in the liver tissue.

*Kidney*: Extensive haemoglobinaemia in the lumen, and haemosiderosis in the epithelium of tubuli and also in the lumen. Some of the tubuli show well-marked fatty changes, due to the presence of medium-sized droplets. Slight vacuole and hyaline droplet degeneration.

*Lung*: Not in-extensive haemosiderosis associated with the endothelials of the capillaries. Also pigmented reticulum cells.

*Spleen*: Extensive haemosiderosis associated with the pulpa of the spleen. With Sudan III deep orange-red droplets seen in the Reticulo-endothelial cells.

*Lymph Gland*: Very extensive haemosiderosis in the sinus cells, and this stands out as a bluish network in the medulla of the gland. A few of the sinus cells with Sudan III show the presence of brick-red droplets. Pigment reticulum cells frequent.

## SHEEP No. 9192.

Particulars of P.M.	Macroscopical Changes.
P.M. on 30.7.24. Spec. No. 4178. Merino Hamel. Condition poor.	Died during the night, therefore the P.M. changes fairly advanced. <i>Pathological Anatomical Diagnosis</i> .—General icterus; extensive pigmentation of kidneys and liver. Hydropericardium. <i>Etiology</i> .—Enzootic Icterus.

## SHEEP No. 9361.

Particulars of P.M.	Macroscopical Changes.
P.M. on 31.7.24. P.M. No. 3896. Spec. No. 4179. Merino Hamel. Full mouth. Condition poor.	<p><i>Adipose Tissue</i>.—Diffuse dirty yellow colour.</p> <p><i>Blood</i>.—Not coagulated and leaves a reddish brown tinge on the hands.</p> <p><i>Liver</i>.—On section a yellowish-green colour; lobulation distinct; a yellowish zone around the central vein.</p> <p><i>Gall Bladder</i>.—Dark green bile.</p> <p><i>Kidneys</i>.—Fair amount of fat in the fat capsule. Fibrous capsule easily detached. Kidneys are enlarged and on section the edges somewhat everted; the parenchyma a diffuse black-red colour; zones not distinct.</p> <p><i>Bladder</i>.—Dark coffee-coloured urine.</p> <p><i>Pathological Anatomical Diagnosis</i>.—Post-mortem changes fairly advanced; general icterus; haemoglobinaemia; haemoglobinuria; oedema of the lungs; hydrothorax; hydropericardium; tumour splenis; acute catarrhal enteritis; oesophagostomum nodules in intestines.</p> <p><i>Etiology</i>.—Enzootic Icterus.</p>

## SHEEP No. 9182.

Particulars of P.M.	Macroscopical Changes.
P.M. on 4.8.24. P.M. No. 3904. Spec. No. 4185. Merino Hamel. Full mouth. Condition fair.	<p><i>Liver</i>.—Slightly enlarged, brownish-yellow colour, lobulation distinct, central vein prominent and around it yellowish-brown pigmented area.</p> <p><i>Kidneys</i>.—Fair amount of fat in fat capsule, which is of a yellow colour. Kidneys are enlarged and cut surface is almost black, zones not well differentiated, edges somewhat everted.</p> <p><i>Small Intestine</i>.—Bile stained.</p> <p><i>Bladder</i>.—Contains about 25 c.c. blood-stained urine.</p> <p><i>Pathological Anatomical Diagnosis</i>.—General icterus; haemoglobinaemia; haemoglobinuria; extensive pigmentation kidneys; pigmentation liver; oedema of the lungs; tumour splenis; hyperaemia and pigmentation lymph glands; parasitic nodules in intestines; hydrothorax.</p> <p><i>Etiology</i>.—Enzootic Icterus.</p>

## SHEEP No. 9258.

<i>Particulars of P.M.</i>	<i>Macroscopical Changes.</i>
P.M. on 5.8.24. P.M. No. 3907. Spec. No. 4187. Merino Hamel. Full mouth. Condition poor.	<i>Adipose Tissue.</i> —Yellow coloured. <i>Blood.</i> —Stains fingers reddish-brown. <i>Lymphatic Glands.</i> —Somewhat swollen, moist and yellowish colour. <i>Pathological Anatomical Diagnosis.</i> —Post-mortem changes fairly advanced. Slight icterus; anaemia; oedema of lungs; slight tumour splenis; pigmentation kidneys. <i>Etiology.</i> —Enzootic Icterus.

## SHEEP No. 9180.

<i>Particulars of P.M.</i>	<i>Macroscopical Changes.</i>
P.M. on 6.8.24. P.M. No. 3910. Spec. No. 4189. Merino Hamel. 4-tooth. Condition good.	<i>Blood.</i> —Not coagulated. Does not stain normally. <i>Liver.</i> —Yellow-brown colour, margins somewhat rounded. On section the edges of cut surface everted. Parenchyma yellowish-brown. Central veins prominent. <i>Kidneys.</i> —Swollen, on section edges of cut surface everted, parenchyma very dark greenish-red and the cortex shows greyish radial striations. Consistence somewhat friable. <i>Pathological Anatomical Diagnosis.</i> —Fairly well marked generalized icterus, oedema of lungs, gangrenous pneumonia apical lobe right lung; fatty degeneration of myocardium. Pigmentation and degeneration of liver; extensive pigmentation of kidneys; parasitic nodules in intestines. <i>Etiology.</i> —Enzootic Icterus.

## SHEEP No. 9300.

<i>Particulars of P.M.</i>	<i>Macroscopical Changes.</i>
P.M. on 6.8.24. P.M. No. 3911. Spec. No. 4190. Merino Hamel. Aged. Condition poor.	<i>Pathological Anatomical Diagnosis.</i> —General Icterus; pigmentation of spleen and liver; tumour splenis; degenerative changes myocardium and liver; endocardial petechiae; parasitic nodules in intestines. <i>Etiology.</i> —Enzootic Icterus.

## SHEEP No. 9438.

<i>Particulars of P.M.</i>	<i>Macroscopical Changes.</i>
P.M. on 28.9.24. P.M. No. 3877. Spec. No. 4171. Merino Hamel. Full mouth. Condition poor.	<i>Adipose Tissue.</i> —Throughout the body a canary-yellow colour, which on standing becomes brownish. <i>Blood.</i> —Leaves a dirty brown colour on the fingers. <i>Liver.</i> —Yellow-brown, lobulation distinct, central veins very prominent. <i>Gall Bladder.</i> —Enlarged and distended with a very viscid almost black bile. <i>Kidneys.</i> —Fair amount of fat in the fat capsule, kidneys are slightly enlarged, on section appear very dark red in colour, zones not distinct, fibrous capsule easily detached. <i>Caecum and Ansa Proximalis.</i> —Show the presence of a fair amount of dry hard faeces. Mucous membranes swollen and have a reddish-brown colour. <i>Pathological Anatomical Diagnosis.</i> —Anaemia; general icterus; haemoglobinaemia; extensive pigmentation kidneys; hydropericardium; pigmentation and tumour splenis; constipation caecum and colon, pigmentation liver. <i>Etiology.</i> —Enzootic Icterus.

## SHEEP No. 10672.

<i>Particulars of P.M.</i>	<i>Macroscopical Changes.</i>
P.M. on 12.1.25. P.M. No. 4290. Spec. No. 4629. Merino Hamel. 4 Tooth. Condition fair.	<i>Pathological Anatomical Diagnosis.</i> —General icterus; ecchymoses epicardium; hyperaemia lungs; pigmentation liver; extensive pigmentation kidneys; parasitic nodules in intestines. <i>Etiology.</i> —Enzootic Jaundice.

## SHEEP No. 10477.

<i>Particulars of P.M.</i>	<i>Macroscopical Changes.</i>
P.M. on 12.1.25. P.M. No. 4291. Spec. No. 4630. Merino Hamel. Full mouth. Condition fair.	<i>Pathological Anatomical Diagnosis.</i> —General icterus; pigmentation liver; extensive pigmentation kidneys; sub-epicardial and sub-endocardial haemorrhages; degeneration myocardium; localized hyperaemia in stomach and intestines. Slight pulmonary oedema and hyperaemia; haemoglobinuria. <i>Etiology.</i> —Enzootic Icterus.

## SHEEP No. 10655.

<i>Particulars of P.M.</i>	<i>Macroscopical Changes.</i>
P.M. on 14.1.25. P.M. No. 4294. Spec. No. 4635. Merino Hamel. Full mouth. Condition good.	<i>Pathological Anatomical Diagnosis.</i> —Generalized icterus; swelling and slight hyperaemia of some lymph glands; haemoglobinaemia; haemoglobinuria; hyperaemia of lungs; extensive pigmentation and degeneration kidneys; constipation in small and large intestines; tumour splenis and hyperplasia of lymph follicles in spleen. Pigmentation and degeneration liver. <i>Etiology.</i> —Enzootic Icterus.

## SHEEP No. 10580.

<i>Particulars of P.M.</i>	<i>Macroscopical Changes.</i>
P.M. on 21.1.25. P.M. No. 4311. Spec. No. 4662. Merino Hamel. Full mouth. Condition good.	<i>Liver.</i> —On section yellowish-brown appearance, lobulation fairly distinct, central vein contains a good deal of blood. Rest of the lobule has a light yellowish appearance. <i>Kidneys.</i> —Markedly swollen; capsule easily detached; on section a diffuse dark reddish-brown appearance; zones not distinct; kidney substance protrudes somewhat. <i>Small Intestines.</i> —Here and there small haemorrhages. <i>Large Intestine.</i> —Reddish areas in patches, caecum and colon contain a quantity of firm dry faeces. In places this is partly blood stained. <i>Bladder.</i> —Distended with a coffee coloured urine. Mucous membrane is brownish in colour. <i>Blood.</i> —Not properly coagulated, has a brownish tinge. <i>Pathological Anatomical Diagnosis.</i> —Generalized icterus; haemoglobinaemia; haemoglobinuria; extensive pigmentation kidneys; hyperaemia and oedema of lungs; marked tumour splenis; pigmentation and degeneration liver; degeneration myocardium; sub-endocardial haemorrhages left endocard. Constipation caecum and colon. <i>Etiology.</i> —Enzootic Icterus.

## SHEEP No. 14922.

<i>Particulars of P.M.</i>	<i>Macroscopical Changes.</i>
P.M. on 9.9.26. P.M. No. 5864. Spec. No. 6249. Merino Hamel.	<i>Pathological Anatomical Diagnosis.</i> —General anaemia; general icterus; enlargement and pigmentation of liver, spleen, kidneys; Nephrosis; pigmentation lymph glands; parasitic nodules in intestines; slight acute catarrhal enteritis; slight constipation ansa proximalis. <i>Etiology.</i> —Enzootic Icterus, killed for the collection of material.

## MICROSCOPICAL CHANGES.

*Liver*: Typical pigment cells present, especially around the central vein. These cell foci are accompanied by clusters of neutrophiles, causing slight atrophy of liver cells. There is also a definite interstitial hepatitis. With Sudan III it is interesting to note that these reticulum cells occur in interrupted streaks, from the periphery to the central vein, and associated with them are the neutrophile accumulations. With Berliner Blue, no haemosiderin, but the pigment cells stand out clearly, filled to bursting with a regular yellow-brown granular pigment. The liver cells themselves show minute pigment granules, but only sparsely dusted over the cytoplasm of the cell. (See Plate XI.)

*Kidney*: Haemoglobin in the lumen of the tubules. Extensive haemosiderosis associated with the epithelium of nearly all the tubuli in the cortex. Fat droplets not infrequent in the epithelium of the tubuli. Here and there evidences of karyolysis and pyknosis, and slight hyaline droplet formation.

*Lungs*: Numerous pigment cells detected, and with Sudan III give the capillaries a brownish hue. With Berliner Blue, a good deal of haemosiderin present, but where does it come from, seeing that none was present in the liver? The distribution of the pigment is not in blotches (as seen in splenectomy and Anaplasmosis), but more diffuse. It is not quite clear from the sections whether the brown pigment with Sudan III is haemosiderin, or the pigment of reticulum cells seen in the liver.

*Spleen*: Extensive haemosiderosis associated with the pulpa. The Reticulo-endothelial cells involved show fatty substances with Sudan III.

*Lymph Gland*: Haemosiderosis in sinuses of medulla. In lymphoid tissue, of the cortex, clusters of cells, which with haemalum-eosin stain light yellow, and with Sudan III reddish-brown. Apparently similar to cells seen in the liver (reticulum cells).

*Blood Smear*: Slight anisocytosis; slight polychromasie and punctate degeneration.

*Liver Smears*: (1) *Liver cells* with yellowish-brown pigment granules, dusted over the cytoplasm of the cell.

(2) *Reticulum cells* with small nucleus and large amount of cytoplasm filled to bursting with greyish-blue globular granules. Not frequent. (See Plate VI.)

(3) *Free pigment* in irregular masses, homogeneous, stains light yellow-brown.

(4) *Pigment* in form of casts of greenish-brown colour in places lying across the cytoplasm of liver cells.

(5) Monocytes.

(6) No typical stern cells.

(7) Eosinophiles.

*Mediastinal Lymph Gland Smears*: Lymphocytes, lymphoblasts, fair number of neutrophiles, eosinophiles, plasma cells; reticulum cells with dark greyish-blue globular granules as in liver smears.

*Periportal Lymph Gland Smears*: Same as above, but also show a few vacuolated endothelials of the stern type of cell, with a light-greyish-blue cytoplasm, circumscribed vacuoles, and also twice the size of monocytes. A lepto-chromatic nucleus, more or less irregularly quadrilateral.

*Spleen*: (1) Endothelials, some of which are vacuolated.

(2) Monocytes with erythrophagocytosis.

SHEEP No. 9388.

Particulars of P.M.	Macroscopical Changes.
P.M. on 19.8.24. P.M. No. 3941. Spec. No. 4253. Merino Hamel. Condition fair.	<p><i>Blood</i>.—Not coagulated, brownish tinge.</p> <p><i>Majority of Lymph Glands</i>.—Swollen, moist on section and brownish in colour.</p> <p><i>Lungs</i>.—Dirty brownish colour.</p> <p><i>Liver</i>.—Much enlarged; shows a few encapsuled parasitic nodules. On section has a diffuse saffron yellow colour; marked yellowish pigmentation around the central vein.</p> <p><i>Bladder</i>.—Distended with a blood stained urine.</p> <p><i>Kidneys</i>.—Very dark diffuse iron-grey colour on section, and appear swollen.</p> <p><i>Pathological Anatomical Diagnosis</i>.—Haemoglobinaemia, haemoglobinuria; general icterus; pigmentation liver and spleen; tumour splenis; extensive pigmentation kidneys.</p> <p><i>Etiology</i>.—Enzootic Icterus.</p>

## MICROSCOPICAL CHANGES.

*Liver*: The columns of liver cells distorted, especially towards the central vein, where their arrangement is very irregular. Liver cells around the central vein are atrophied, and some have altogether disappeared from the column. Only the connective tissue stands and other desquamated cells fill up the spaces. In places distended bile canaliculi can be made out, especially towards the periphery. Both around the central vein and in Glisson's capsule there appears to be an increase of collagen fibres and in the capsule in places an apparent increase of round cells, chiefly of the lymphoid series. With Berliner Blue stain very few endothelials with Haemosiderin, but desquamated cells and liver cells show a greenish-brown granular pigment. The desquamated cells referred to were difficult to identify. Are they dislodged reticulum cells, or are they desquamated stern cells? They vary in size and shape, according to the amount of pigment present. They are present everywhere in the lobule, but more particularly in great numbers around the central veins. The nuclei of these cells also show various changes as regards their distribution, and in some the nuclei are absent. Some of the cells with Sudan III show the presence of brick-red granular pigment, causing extensive swelling of the cell and disappearance (due to pigment) of the nucleus. Some of these cells reach great dimensions (see Plate X, Specimen No. 6208, where a number of these cells have been sketched). It will be seen that some are spherical while others have irregular shapes. Blood smears made from the liver and stained with Giemsa show these cells to be of the nature of reticulum cells (see Plate XI, Sheep No. 14922), and not liver cells. These cells seem to become larger and larger in dimensions as one proceeds from the peripheral part of the lobule to the central vein.

*Kidneys*: Haemoglobinaemia in the form of a reddish homogeneous material (with haemalum and eosin) can be identified in the lumen of the tubuli, Bowman's capsule, and glomeruli. With Berliner Blue stain the colour is greenish-yellow. No Haemosiderin observed. The epithelium of the tubules show a hyaline droplet degeneration.

*Lungs*: Capillaries distended with blood. Here and there are large round cells with a granular brown pigment of the nature of reticulum cells seen in the liver. With Berliner Blue stain only a few cells with Haemosiderin detected. These cells are smaller than the above.

*Spleen*: Here and there an occasional endothelial with Haemosiderin seen; lymphoid tissue appears suppressed as a result of the great amount of blood present in the sinuses. Note a fairly large number of neutrophiles. Also large endothelials present containing a yellow-brown granular pigment.

## SHEEP No. 14807.

<i>Particulars of P.M.</i>	<i>Macroscopical Changes.</i>
P.M. on 1.9.26. P.M. No. 5848. Spec. No. 6214. Merino Hamel. Condition good.	<i>Pathological Anatomical Diagnosis.</i> —General icterus; pigmentation and degeneration kidneys; oedema and hyperaemia of lungs; tumour splenis; haemoglobinuria. <i>Etiology.</i> —Enzootic Icterus.

## MICROSCOPICAL CHANGES.

*Liver*: Lobules around central veins distorted and liver cells absent. The remaining cells show extensive fatty degeneration; not so many pigment cells seen, as in other cases; from this section it would appear that the pigment cells are reticulum cells. Very few distended bile canaliculi seen, i.e. not much bile stasis present. With Sudan III fairly extensive fatty degeneration of liver cells around the central vein. This extends irregularly into the rest of the lobule, about half to two-thirds of the lobule involved; as a result of the fatty changes, the liver cells affected vary in size and shape. Two types of pigments seen: (1) In liver cell golden-yellow pigment, which seems to be similar to the pigment in the bile canaliculi, and (2) brownish granular pigment in the reticulum cells. The latter is of a different colour, and the cell is filled to bursting, whereas in the liver cell only part of the cell is involved.

*Kidney*: With Berliner Blue extensive haemosiderosis in the epithelium, and also in the lumen of the tubules. In the epithelium, the pigment is in the form of intense blue, minute granules, whereas in the lumen it is a diguse bluish mass. In a few places there is haemoglobin present in the lumen. Many tubules (especially tubuli contorti), show necrosis and desquamation of the epithelials to a slight extent (nephrosis).

*Spleen*: Moderate haemosiderosis.

*Lungs*: Haemosiderin granules as in Specimen No. 6221, not in masses, and not frequent.

SHEEP No. 15196.

<i>Particulars of P.M.</i>	<i>Macroscopical Changes.</i>
P.M. on 27.9.26. P.M. No. 5913. Spec. No. 6296. Merino Hamel. Aged. Condition poor.	Anaemia; haemoglobinaemia; haemoglobinuria; general icterus: extensive pigmentation of lymph glands; pigmentation and slight tumour splenis; pigmentation and degeneration kidneys and liver; slight constipation large intestine; slight parasitic nodular changes. <i>Etiology.</i> —Killed in extremis, (Enzootic Icterus).

#### MICROSCOPICAL CHANGES.

*Liver*: Similar picture to specimen No. 6291, i.e. pigment cells, atrophy of columns of liver cells of the lobule, especially around the central vein. Along the periphery of the lobule distention of bile vessels. Also interstitial hepatitis. No iron pigment seen.

*Liver Smear*: Note again the difference between liver cells, and reticulum cells with their bluish granular cytoplasm.

*Kidneys*: Same as for Specimen No. 6291, i.e. hyaline droplet degeneration, extensive haemoglobinaemia in the tubules and Bowman's capsule. Some nuclei show pyknosis; note also haemosiderin in epithelium.

*Lungs*: Same as for Specimen No. 6291.

*Spleen*: Apparent atrophy of lymphoid tissue, otherwise like Specimen No. 6291.

*Lymph Glands*: Compare Specimen No. 6291. One gland shows with Sudan III: (1) Reticulum cells filled with pigment of reddish-brick colour, in all stages from cells of ordinary size to very large cells.

(2) Clusters of large, spherical cells of equal size and a light brownish pigment lying in between the stroma. The pigment is granular.

(3) Ordinary desquamated cells of the sinuses with usual pigments.

*Periportal Lymph Gland Smear*: (1) Large cells of the stern-cell type and vacuolated. Not infrequent.

(2) Large reticulum cells, which with Giemsa assume a regular granular bluish appearance, and possess a small round nucleus, etc.

SHEEP No. 14814.

<i>Particulars of P.M.</i>	<i>Macroscopical Changes.</i>
P.M. on 7.9.26. P.M. No. 5859. Spec. No. 6236. Merino Hamel.	<i>Pathological Anatomical Diagnosis.</i> —Slight general icterus; pigmentation liver, spleen and periportal lymph glands; parasitic nodules in intestines. <i>Etiology.</i> —Killed (regarded as an early case of Enzootic Icterus).

#### MICROSCOPICAL CHANGES

*Liver*: Slight round cell infiltration in Glisson's capsule. The liver lobules, as regards arrangement of the columns, not distinct; here and there the columns not well stained, and stand out as lighter masses in which the nuclei are irregular in their position. Some nuclei are larger than normal. The liver cells are vacuolated and numbers are missing around the central vein, giving the impression that liver cells have disappeared and their place taken by distended blood vessels. Large pigment cells yellowish-brown with haemalum-eosin; they are granular, vary in size and shape from spherical to rhomboid. The nucleus in many instances is situated at the periphery and much smaller in comparison with the cytoplasm, the mass of the cell being made up of this pigment. The cells are chiefly situated around the central veins. The remaining liver cells show well-marked fat droplets, chiefly of medium size. The brown pigment cells stand out very prominently and the liver tissue (cells) instead of being dark blue with Sudan III, is light-greyish in colour. With this stain a definite interstitial hepatitis can be identified. The pigment cells in the liver lobule have a linear arrangement. With Berliner Blue no iron seen.

*Kidneys*: Slight diffuse blue staining of the tubuli contorti. With haemalum-eosin dark reddish and in some of the tubuli haemoglobin is present. Very little impairment of the epithelium of tubules.

*Lungs*: Like specimen No. 6220.

*Spleen*: Like specimen No. 6220, but more haemosiderin present and extends up to the well-formed follicles.

*Mediastinal Lymph Glands*: Haemosiderosis of sinus cells. Fat cells in substance of gland.

*Periportal Lymph Glands*: Fat in reticulum cells of the lymphoid tissue; desquamation and pigmentation of sinus cells. Very little haemosiderin.

*Another Lymph Gland*: Distinct haemosiderin in the sinus cells.

SHEEP No. 14795.

Particulars of P.M.	Macroscopical Changes.
P.M. on 3.9.26. P.M. No. 5851. Spec. No. 6221. Merino Hamel. Full mouth. Condition good.	<p><i>Liver</i>.—Slightly swollen, calcareous cyst present; margins well defined; lobulation distinct through the capsule; colour is dark brown; on section the liver has a greenish-yellow brown appearance.</p> <p><i>Spleen</i>.—Much enlarged; on section the edges everted; substance of the spleen has a glassy-looking granular surface, dark reddish brown in colour, Malpighian bodies and trabeculae not distinct.</p> <p><i>Kidneys</i>.—Much swollen; on section zones not distinct, blackish-brown throughout, but in the cortex greyish striations can be made out; substance of the kidney somewhat dull looking.</p> <p><i>Small Intestines</i>.—Bile stained; swollen; thick bile stained material can be scraped off, and faeces soft.</p> <p><i>Caecum</i> contains hard firm faeces in form of cylindrical masses 2 cm. in diameter and 4 cm. in length; faeces somewhat adherent to the mucous membrane.</p> <p><i>Pathological Anatomical Diagnosis</i>.—General icterus; haemoglobinæmia; haemoglobinuria; extensive pigmentation kidneys and liver; constipation caecum and ansa proximalis of colon; tumour splenis.</p>

MICROSCOPICAL CHANGES.

*Liver*: One might divide the lobule into a third and two-thirds, i.e. one-third around the central vein and two-thirds bordering on the periphery. The columns of cells evident in the two-thirds, but in the third around the central vein the majority of the liver cells are missing, and with haemalum-eosin these areas stand out as lighter patches. The place of these cells is taken up by debris, i.e. light greyish-pink, irregular material, several desquamated large pigment cells filled with a yellowish-brown granular pigment, blood, a few neutrophiles and what appears to be free nuclei. In the periphery the canaliculi are distended to bursting with bile pigment, and stands out as a much interrupted network. The pigment is yellowish-green. The liver cells of the periphery do not stand out clearly and show the presence of vacuoles. What is the nature of these pigment cells? From the examination of the Giemsa smears of the liver it would appear that these cells are reticulum cells, i.e. cells filled to bursting with greenish-blue, small granules and have a small spherical nucleus (see Plate XI, Sheep No. 14922). With Sudan III the majority of the remaining liver cells show presence of very minute fat droplets. The above pigment cells stand out as large cells with regular small granules of brownish colour. The pigment in canaliculi is diffuse greenish-yellow. With Berliner Blue there is no trace of iron.

*Liver Smears*: Note cells mentioned above. No well-defined liver cells seen. They are irregular, with washed out cytoplasm and often without a nucleus. Yellow-brown pigment present in these cells, and in some, greenish-brown cylinders.

*Kidney*: Extensive haemoglobin in Bowman's capsule whereas the lumen of tubules distended with this homogeneous scarlet pigment when stained with haemalum-eosin. Very large amount of it present in the straight tubules. Here and there also Haemosiderin in the tubules. With Berliner Blue many of the tubuli contorti here and there stain a light greyish-blue, not intense. There is here and there some desquamation of epithelial cells with vacuole formation. The appearance of the epithelium is the same as Specimen No. 6220, i.e. nephrosis, vacuole degeneration, and hyaline droplets and fatty degeneration.

*Lung*: Berliner Blue. Here and there endothelials with haemosiderin, but present only in the form of a few granules, dark blue in colour, in the cytoplasm of the cell, not at all so clear and outstanding as described in the Anaplasmosis and Splenectomy experiments. With Sudan III a number of

endothelials with yellowish-brown granules, some are fine and others coarse, and amongst them here and there a fat droplet can be identified. With haemalum-eosin numbers of endothelials in the capillaries packed with yellowish granules similar to those seen in the liver.

*Spleen*: Extensive haemosiderosis, but in the areas around the modified and atrophied lymph follicles, there is a good deal of blood and little pigment. The pigmentation is associated with the pulpa, and to a small extent with the venus sinuses which contain a good deal of blood. Good few eosinophiles and neutrophiles present.

*Mediastinal Lymph Gland*: Extensive pigmentation in the desquamated sinus cells which stands out as a prominent and definite network. These cells are round. On the other hand there are numbers of irregular, angular cells lying in the lymphoid tissue, filled with pigment. (See Plate VI.) With Berliner Blue extensive although no intensive haemosiderosis; large spherical endothelial cells (sinus cells) filled with yellowish pigment as well as haemosiderin, and in many cells both pigments are present. With haemalum-eosin all stages of erythrocytes can be seen, from pinkish-red to yellow, to irregular stained globules.

*Iliac Lymph Gland*: Ditto, but extensive fatty material present in the lymphoid tissue.

*Mesenteric Lymph Gland*: Extensive desquamation and pigmentation of sinus cells, but mainly due to fine fat droplets. No haemosiderosis.

*Mediastinal Lymph Gland*: No haemosiderin, but fat pigment in some sinus cells, especially in cortical sinuses. The main portion of the medulla is converted into adipose tissue, i.e. large vesicles containing fat.

<p><i>Adrenals</i> <i>Thyroids</i> <i>Cerebellum</i> <i>Cerebrum</i> <i>Large Intestine</i> <i>Small Intestine</i></p>	}	No lesions detected.
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*Blood Smear*: Slight anisocytosis; polychromasia, normoblasts; numerous "ghost" erythrocytes. No erythrophagocytosis encountered.

*Liver Smears*: (1) Not well defined liver cells seen. Some contain yellow brown pigment, others with casts of canaliculi.

(2) Fair number of eosinophiles.

(3) Monocytes.

(4) Few typical stern cells with erythrophagocytosis.

*Spleen Smears*: Numerous free nuclei; monocytes; eosinophiles frequent; neutrophiles; few normoblasts; endothelials vacuolated and with small amount of pigment. Plasma cells?

*Lung Smears*: Free nuclei; monocytes; vacuolated endothelial; neutrophiles; normoblasts.

*Bone Marrow Smears*: Many cells of the eosinophile group present.

#### SHEEP No. 14739.

Particulars of P.M.	Macroscopical Diagnosis.
<p>P.M. on 2.9.26. P.M. No. 5849. Spec. No. 6220. Merino Hamel.</p>	<p><i>Blood</i>.—Not coagulated, has a distinct tinge of a dirty brown colour. <i>Liver</i>.—Lobulation distinct; yellowish-brown on section; central veins distended with blood. Around the central vein there is a somewhat yellowish opaque zone. <i>Kidneys</i>.—Zones not distinct. The cortical zone is very dark brown and the medullary zone dark reddish-grey; one zone merges into the other. Both zones are enlarged. <i>Caecum and ansa proximalis of colon</i>.—Contains a large amount of chocolate brown faeces, mudlike in appearance. <i>Pathological Anatomical Diagnosis</i>.—Generalized icterus; degeneration and pigmentation liver; pigmentation and degeneration kidneys, pigmentation spleen and urine; slight acute catarrhal enteritis; pigmentation of faeces in caecum and colon (ansa proximalis). <i>Etiology</i>.—Killed by bleeding while in extremis as result of Enzootic Icterus.</p>