

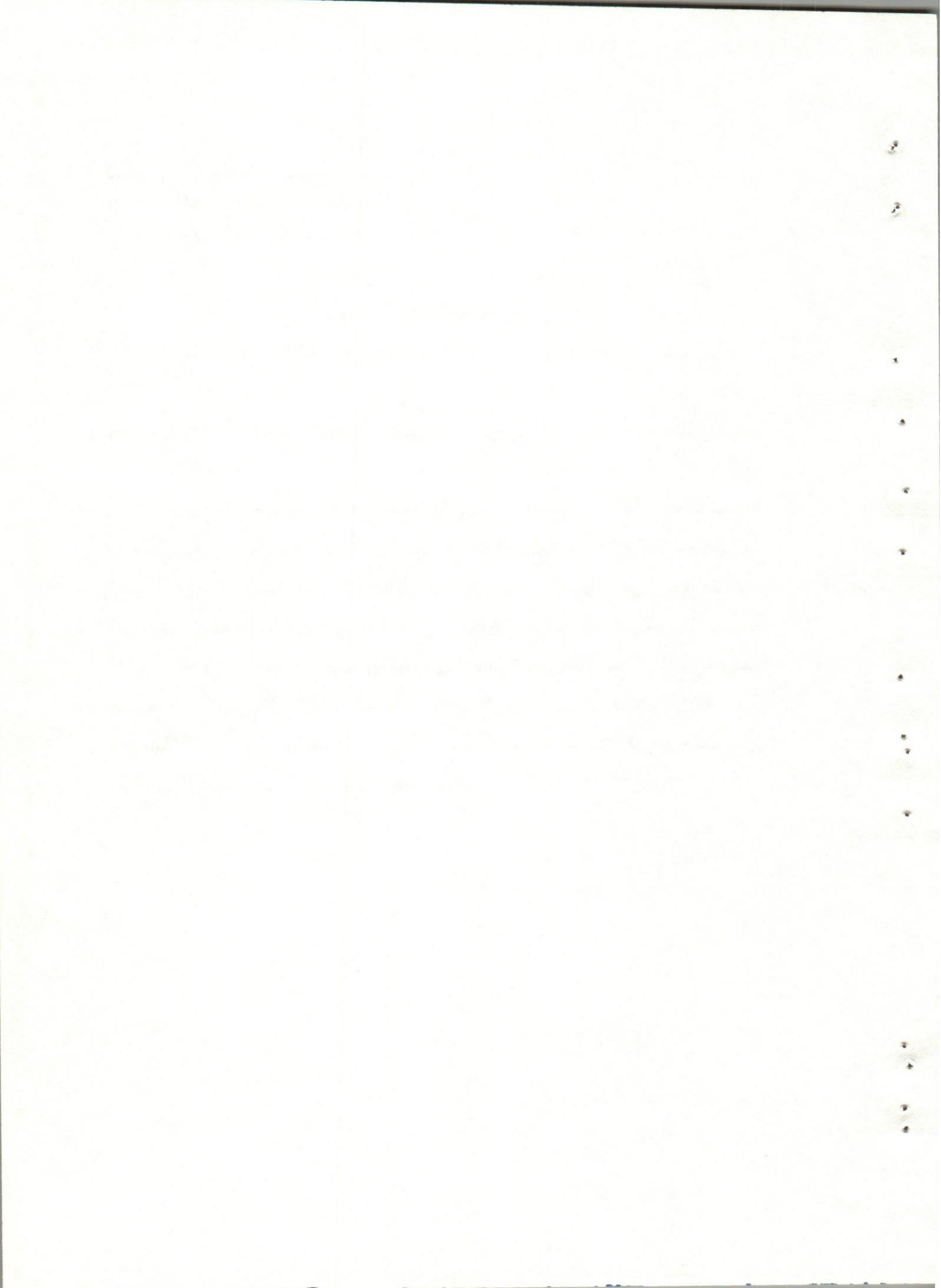
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حمى الوادى المتصدع

دراسات عن الاصابة في العجول الجاموسى والأجنة المجهضة

علام نفاذى ، عبد اللطيف بيومى ، محمود عبد الظاهر ، محمد صلاح الدين

أجرى البحث فى منطقة أسيوط على عدد خمسة عشر عجلا وعجلاة
جاموسى رضع ، وكذلك على اثنين من الاجنة المجهضة . الاعراض الاكلينيكية
التي أمكن ملاحظتها هي نسبة عالية من الاجهاض ، اسهال فى العجول
الرضيعه ونسبة اصابات نفوق عاليه من العجول الرضيعة . تم عمل الصفه
التشريحيه وكذا الفحص الهستوباثولوجي لخمسه عشر عجلا وعدد اثنين أجنة
مجهضة . تركزت التغيرات الباثولوجية فى كل من الكبد ، الرئتين والكلى
والامعاء ، وأشارت النتائج الى اصطحاب النزلات المعويه لمرض حمى
الوادى المتصدع فى العجول الرضيعه .



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**RIFT VALLE FEVER : PATHOLOGICAL CHANGES ON THE
SUSPECTED BUFALOE CALVES AND ABORTED FOETUSES**
(With 8 Figures)

By
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SUMMARY

A detailed pathomorphological and histopathological picture of most of organs of buffalo calves and aborted fetuses in suspected cases of R.V.F were described. These changes were discussed with a similar changes occurring during this diseases in other species and the differences were pointed out.

INTRODUCTION

Rift valley fever is an acute viral disease of animals and man. It mainly affects sheep and cattle causing high mortality rate amongst lambs and calves, and abortion in the adult animals. The disease has been firstly reported in Egypt in October, 1977 (IMAM EL-KARMANY and DARWISH, 1978). In Assiut governorate, the first cases had been detected in sheep at El-Hawattka in November-December, 1977 (DEEB, BAYOUMI, SALEM and RAGHIB, 1977).

In 1931, Daubney Hudson and Garnham reported an outbreak of the disease in dairy cattle characterised by rise of temperature, abortion and deaths. DICKSON (1951) observed general haemorrhages and oedema in the aborted cattle fetuses. On the other hand, JUBB and KENEDY (1963) described no specific signs of the disease in cattle. SMITH JONES and HUNT (1974) stated varying manifestations in the susceptible species.

Analysis of the literature revealed that, although the pathological changes that occur in natural and experimental infection in sheep took the greatest attention, the characteristic gross and microscopic changes in Rift valley fever in cattle have been clarified yet.

The present work describes the morphopathological changes in suspected infected calves and aborted foetuses at El-Hawattka governmental farm in January 1983.

MATERIALS and METHODS

The present work was performed on fifteen buffalo-calves and three aborted fetuses derived from an governmental farm in El-Hawattka - Assiut. The age of the dead calves varied from two days to four weeks. The case history, clinical symptoms and gross pathological changes were reported. After complete examination of each animal, specimens from the liver, gall bladder, kidneys, lung, heart, intestine, spleen, lymph nodes, adrenals and brain were taken. These materials were fixed in 10% neutral buffered formalin and embeded in paraffin. Sections were stained with haematoxylin and eosin. In addition, periodic acid Schiff reaction and Feulgen reaction (BANCROFT, 1967) were carried out for detection of the nature of the inclusion bodies. Moreover, frozen sections of the liver were stained with suttan black for demonstration of fat.

RESULTS

Clinical signs

The diseases appeared in the form of increased incidence of abortion accompanied by drooping of milk yield. No. deaths among the herd was observed. In regard to suckling calves, foeted diarrhia, fever, roughness of the hair and wrinkling of the skin accompanied by respiratory manifestations and higher mortality rate were reported. The clinical signs proceeded death in calves did not lasted more than thirty-six hours in most of cases.

Gross findings

The gross lesions observed in the dead calves were insignificantly differed. In all calves the buccal mucosa was severely congested. Subcutaneous ecchymotic haemorrhages were detected specially in the regions of axillae and medial aspects of the limbs. In addition, the vascular ramifications were severely congested. The liver was slightly enlarged and its surface mottled with grey to greyish-red foci. In two calves, multiple small grevish-white necrotic foci surrounded by red zones were observed. In another two calves, a number of minute abscesses were found in the right lobe. Otherwise, invariable degrees of congestion were noticed. The gall bladder was greatly distended and with a congested mucosa. The kidneys were slightly enlarged, congested and soft in consistency. In two cases, small sized white abscesses were found on the surface and extended deeply in the cortex. The lungs were hyperaemic and oedematous. In addition, varied degrees of pneumonia were observed in four cases. The consolidated areas were usually located in the apical and cardiac lobes. In two calves, examination of the lungs revealed distinct small abscesses in their parenchyma. The heart showed epicardial and endocardial peticheal haemorrhages only in three cases. Serous atrophy of the coronary fat and post-mortem clot in the left ventricle were also present. In the intestine, catarrhal enteritis with pronounced congestion of the mucosa was present. In addition, serosal capillaries appeared dilated and engorged with blood. The mesentric lymph nodes were enlarged, oedematous and congested. The spleen showed peticheal haemorrhages on the capsule in one case. The adrenals were enlarged and congested. The meningeal blood vessels were hyperaemic and this was a prominent feature in all calves examined.

Gross examination of the foetuses revealed the presence of diffuse subcutaneous peticheal and ecchymotic haemorrhages. A blood exudate was also found both in the thoracic and abdominal cavities. The liver was enlarged and showed circumscribed pale yellowish areas on the parital surface. On cut section, small haemorrhagic foci resembling those of telangiectasis were also found. The gall bladder was gretly distended and the mucosa congested. The kidneys were soft in consistency and pale in colour. Peticheal haemorrhages were also found on the epicardium.

Histopathological findings

The liver showed many characteristic lesions which were nearly constant in all aborted foetuses and dead suckling calves examined. However, there were some varitions in the incidence and extent of these lesions between the aborted foetuses and dead calves.

At first, a uniform prominent lesion in the liver of aborted foetuses and dead calves was course granular proteinous dystrophy of the cytoplasm of hepatocytes. The nuclei showed margination of the chromatin. In some liver cells the nuclei revealed chromatolysis, however,

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their cytoplasm was still showing the coarse granular dystrophic changes. Kupffer cell were activated and the sinusoids not infrequently entrapping neutrophils.

In addition, focal coagulative necrotic areas with few neutrophilic infiltrations were also found (Fig. 1). These necrotic areas were only present in two calves, however in all the aborted fetuses, they appear as a constant finding and involved wider areas of the hepatic lobules than in case of calves. Also in the aborted fetuses, focal sinusoidal dilatations were formed as a result of necrosis of the hepatic cell cords (Fig. 2).

Together with the above described findings, the liver cells also showed intracytoplasmic as well as intranuclear acidophilic bodies (Fig. 3 a, b). The intracytoplasmic bodies appeared as homogenous hyaline globules of different sizes and were usually surrounded with narrow unstained hallow zones. The intranuclear bodies appeared in the form of eosinophilic masses which pushed the nuclear chromatin peripherally. By using of feulgen and periodic acid schiff reactions, these intracytoplasmic and intranuclear bodies appeared to be feulgen-negative (stained green) and PAS-negative. Both the intracytoplasmic and intranuclear bodies were frequently present in the liver of the aborted fetuses while in dead calves they were not constantl found.

In the liver of dead calves, the portal tracts appeared to be oedematous and infiltrated with aggregates of leucocytes. Evidences of cholangitis had been detected (Fig. 4). The wall was hyperaemic and infiltrated with mononuclear cells. The epithelial cells lining were degenerated, necrosed and detached into the lumen. Bile stasis was also present.

In two calves, focal suppurative hepatitis was observed (Fig. 5). The reaction appeared in the form of necrosis with central liquifaction and heavy iniltration of polymorphnuclear leucocytes.

Microscopically, the wall of the gall bladder appeared thickened together with the presence of mucosal haemorrhage and submucosal oedema.

In the aborted fetuses and dead calves, the histopathological changes in the kidneys were observed mainly in the tubular epithelium. The interstitial tissue and to a lesser extent the glomeruli and blood vessels present in the stroma of the organ were also involved in case of dead calves. Tubulonephrosis in the form of granular proteinous dystrophy and vaccular degeneration was the most prominent lesion present in the proximal and distal convoluted and collecting tubules. Complete dissolution of the cytoplasm was also a frequent finding. The nuclei of the epithelial cells lining the renal tubules specially the periglomerular ones revealed a group of peculiar and attractive changes. Some nuclei exhibited margination of the chromatin substance peripherally toward the nuclear membrane which appeared thickened and deeply stained with haematoxylin. Other nuclei showed aggregation of the chromatin in the form of coarse clumps of variable sizes attached to the nuclear membrane. Fragmentation of the nuclei and even rupture of the nuclear membrane were also observed.

Intracytoplasmic and intranuclear acidophilic bodies resembling those found in the liver were also present in the tubular epithelial cells (Fig. 6). These bodies were frequently found in the kidneys of the aborted fetuses and unconstant in dead calves. Also the intranuclear bodies were not frequently observed as in the liver.

Together with tubulonephrosis, a characteristic lesion in the form of leucocytic casts in the proximal and distal convoluted tubules, and collecting tubules of both the cortex and medulla were found in the kidneys of calves. These casts were formed mainly of more or less intact neutrophils (Fig. 7). In some tubules, these cellular casts were necrosed and appeared

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as hyaline homogenous acidophilic mass with nuclear fragments. The tubules containing the leucocytic casts were dilated and their epithelium showed granular proteinous dystrophic changes.

The interstitial tissue showed focal areas of neutrophilic cell infiltration. The adjacent tubules had atrophied epithelium and dilated lumen.

The glomerular lesion was represented by congestion of the capillary tuft, swelling of the endothelial cells lining it and hyperchromasia of their nuclei. The changes in the blood vessels present in the stroma were usually confined to the endothelial cells lining which appeared swollen with degenerated cytoplasm and hyperchromatic nuclei.

In two calves, extensive neutrophilic cell infiltration with complete disappearance of the tubules was observed both in the cortex and medulla.

The lung lesions were variable. In nine calves, examination of the lungs revealed only extensive dilatation and congestion of the interalveolar and interlobular capillaries. In some alveoli, a pink-stained fluid was also present. In four cases, the lungs showed serous exudation in the alveoli together with polymorphonuclear leucocytes and some septal cells. Degeneration and necrosis of the bronchiolar epithelium were also observed and the lumen contained serous exudate with neutrophilic cells and detached epithelial cells (Fig. 8). Congestion of the interalveolar capillaries was noticed. In two calves, the lung exhibited focal suppurative pneumonia. Considerable areas of the lobules showed intensive neutrophilic infiltration with central necrosis and liquefaction. The adjacent alveoli were filled with serous exudate and the bronchioles revealed no significant pathological changes. Congestion of the interalveolar capillaries and oedema of the interlobular connective tissue were also present.

The lungs of the aborted fetuses only showed oedema of the interlobular connective tissue and a light-pink stained fluid in many alveoli.

In the heart, a slight degree of myocardial degeneration was the only lesion observed in three of the fifteen calves examined.

The intestine of the dead calves exhibited the features of acute catarrhal enteritis. Hyperaemia of the submucosal and serosal blood vessel was noticed. The epithelial cells lining the villi revealed necrosis and desquamation and the intestinal glands were degenerated. Lymphocytic and neutrophilic cellular infiltrations were also found in the mucosa and submucosa. In the aborted fetuses, no pathological changes could be observed in the intestine.

Spleen: The most important histopathological changes in the spleen were represented by decrease lymphocytic cellular density of the malpighian corpuscles and prominent congestion of the red pulps.

DISCUSSION

Rift valley fever is known to occur in Egypt. Sera collected from sheep, buffalo, cattle and goat in Matruh, Alexandria, port said, qena and Aswan governorates during 1977 showed the presence of haemagglutinin inhibition antibodies against the RVF virus. The epidemic was mentioned to originate from sudan (DARWISH, 1981, and SOLLERS, PEDGLEY and TUCKER 1982).

Because the pathological changes of the disease in sheep had received a great attention in the literature. Detailed morphological and histopathological studies of the disease in suckling buffalo-calves and aborted fetuses is described.

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From the constant microscopic findings in the present work was the detection of intracytoplasmic acidophilic hyaline globules as well as acidophilic intranuclear inclusions in both liver and kidney. Histochemically, the inclusions were PAS and feulgen negative. Similar results were obtained by ZHDANOV (1975) in experimental RVF. in green hamster. The author stated that such inclusions are peculiar for the arboviruses.

Chromatin margination, increase amount of coarse chromatin, rupture of nuclear membrane as well as latter fragmentation of nucleus which were prominent feature in our materials had been also described by EASTERBROOK and ROZEE (1971) as pathognomic changes in arbovirus infections. Moreover cytoplasmic dysproteinosis was most prominent in about 98% of the cases within fetuses or suckling calves. While focal hepatic necrosis is constant finding in enzootic hepatitis of sheep (FINDLAY 1932, EASTERDAY *et al.* 1962, SMITH, JONES and HUNT 1974), the lesion was observed as a permanent finding in fetuses but only observed in 13% in suckling calves. That could be probably assumed to either the strain of virus and or species susceptible variation.

Portal reaction, cholangitis as well as kuffer cell activations in our findings may be due to secondary infections especially in two calves microabscesses could be detected in liver, kidney and lung. That perhaps as a result of umbilical infection. Histologically, the kidney tubular nephrosis manifested in our specimens in protein dystrophy of the cytoplasm, margination of nuclear chromatin was also observed by DAUBNEY *et al.* 1931, SCHULZ 1951, MITTEN REMMELE WALKER CARTER, STEPHAN and KLEIN 1970. Moreover leucocytic cellular casts in the renal tubules as well as slight interstitial leucocytic cellular infiltrations were constant findings in our materials.

Regarding to the myocardium, no histopathological changes were observed by DAUBNEY *et al.* (1931). FINDLAY *et al.* (1932) but myocarditis and necrosis were described in dog and cat by MITTEN *et al.* (1970) in sheep by DEEB *et al.* (1979) however only myocardial haemorrhage in adult sheep was reported by EASTERDAY (1962). In our findings myocardiosis without evidence for inflammatory reaction as well as haemorrhages, were observed.

Pulmonary oedema, hyperaemia and slight inflammatory cellular exudate were common findings in suckling buffalo calves. This is in agreement with SCHULZ (1951) and DEEB *et al.* (1975) in adult sheep. microscopic changes in the spleen of dead suckling calves were represented in decreased density of lymphocytes of malpighion corpuscles as it is described by SMITH, JONES and HUNT (1974).

Catarrhal enteritis as well as enlargement of the mesenteric lymph nodes were common findings in our work. Similar findings were observed by DAUBNEY *et al.* (1931), Findlay, (1932). DEEB *et al.* (1979) although haemorrhagic enteritis was described in rats and mice by FINDLAY (1932) and to some extent in adult sheep DEEB *et al.* (1979).

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DESCRIPTION OF FIGURES

- Fig. (1):** Liver showing hepatic necrosis and leucocytic infiltration H.&E. (X10 x 12.5).
- Fig. (2):** Liver showing sinusoidal dilatation and hepatic cell necrosis. H.&E. (X10 x 12.5).
- Fig. (3 a + b):** Liver showing intracytoplasmic inclusions (H.&E. X100 x 12.5).
- Fig. (4):** Liver showing cholangitis H.&E. (X 10 x 12.5).
- Fig. (5):** Liver showing focal suppurative reaction H.&E. (X 10 x12.5).
- Fig. (6):** Kidney showing nuclear inclusions (Cigar shape). H.&E. (X100 x 12.5).
- Fig. (7):** Kidney showing leucocytic cast H.&E. (X 25 x 12.5).
- Fig. (8):** Lung showing purulent bronchopneumona H.&E. (X 10 x 12.5).



Fig. (1)



Fig. (2)

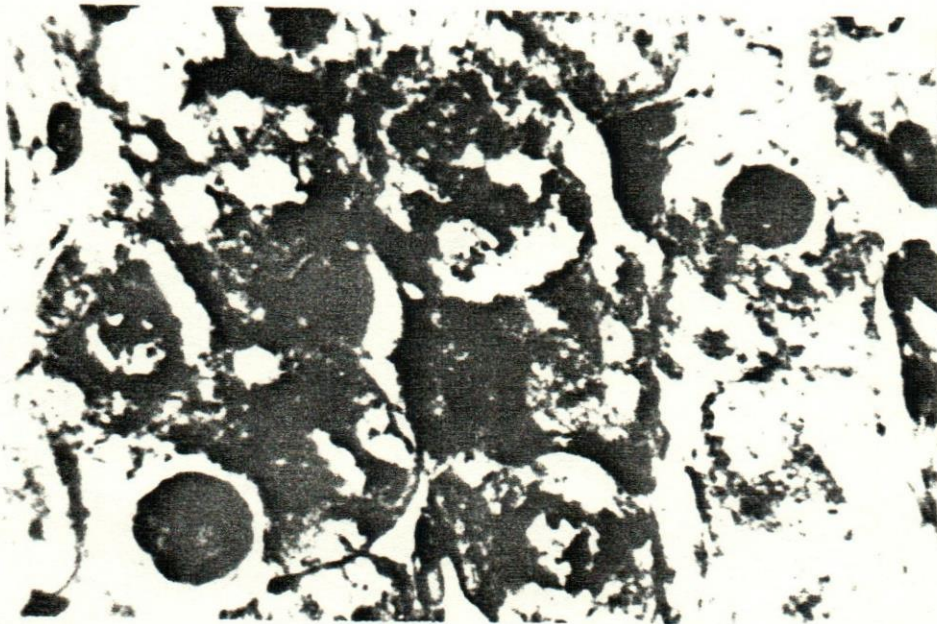


Fig. (3 a)

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Fig. (3 b)



Fig. (4)

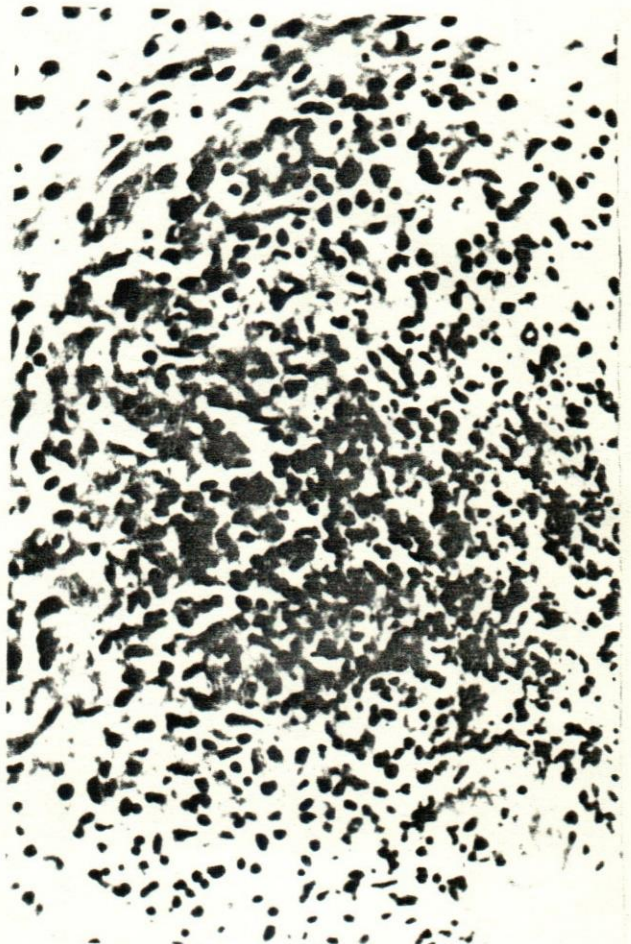


Fig. (5)

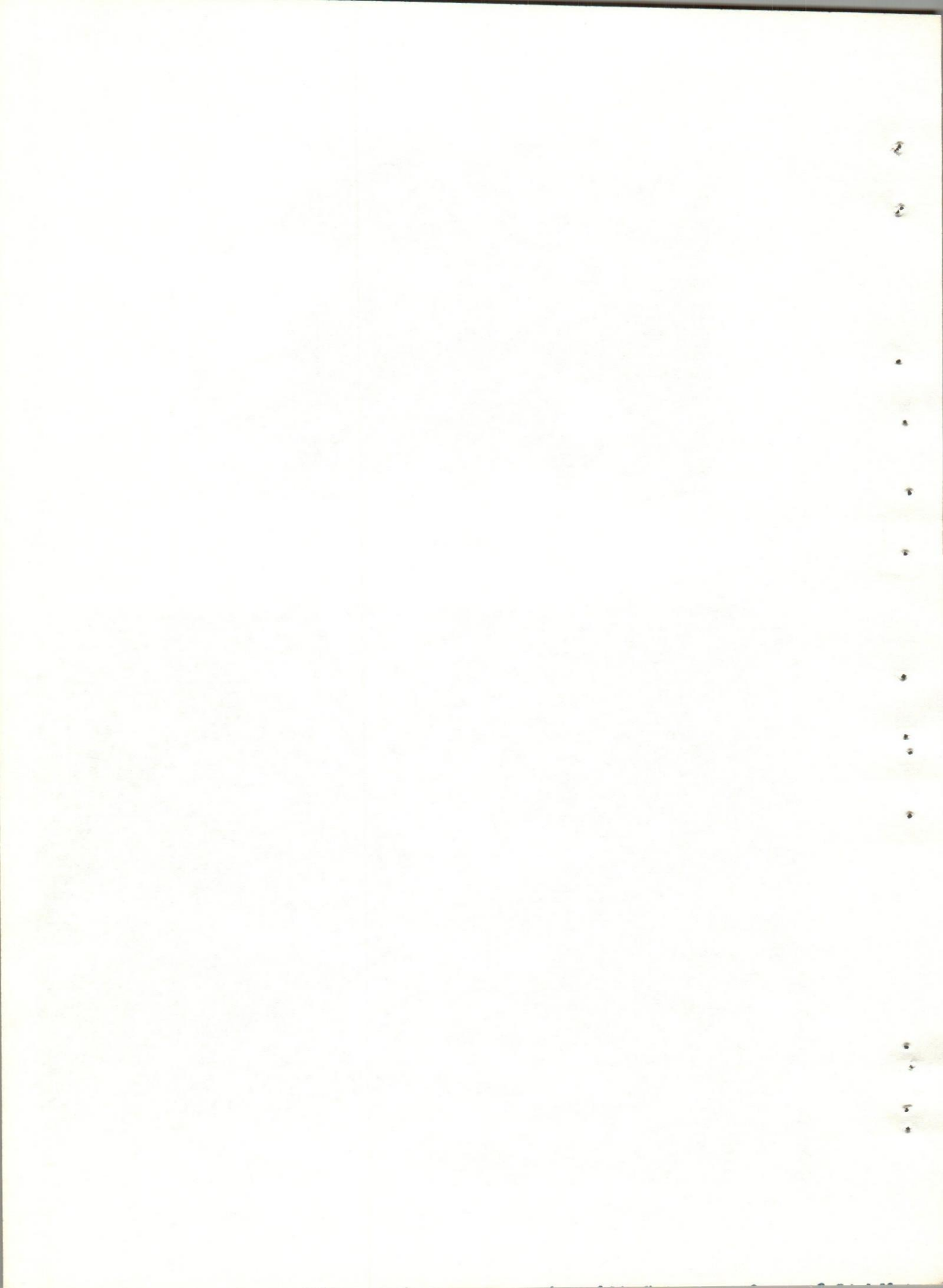




Fig. (6)

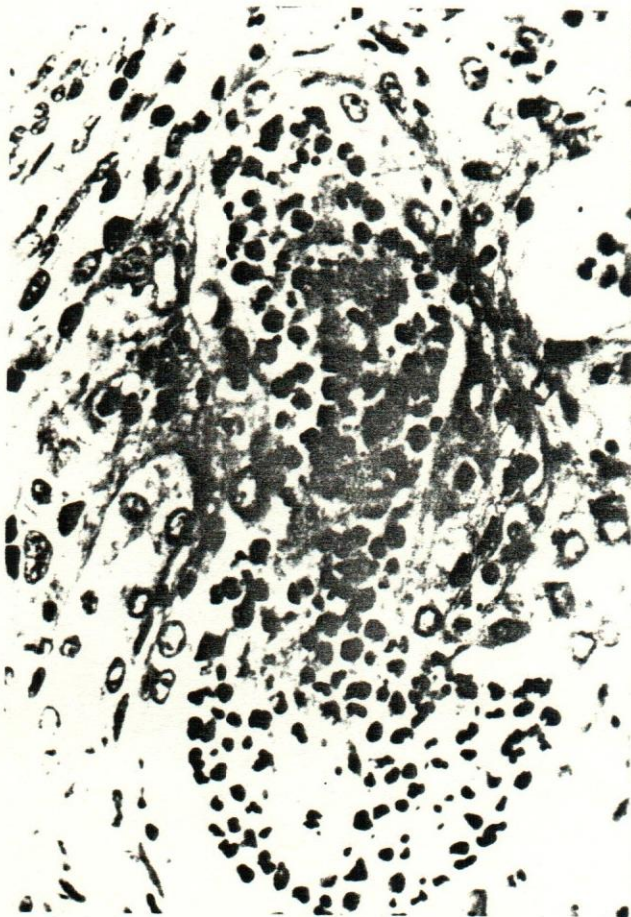


Fig. (7)



Fig. (8)

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