

## **CHRONIC TOXIC HEPATITIS IN DEER FROM A LOUISIANA COASTAL MARSH**

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### CHRONIC TOXIC HEPATITIS IN DEER FROM A LOUISIANA COASTAL MARSH

A white-tailed deer die-off occurred in the coastal marshes of Louisiana in the fall of 1967 following an extended period of below normal rainfall. Surviving deer were reported to be in poor condition. In late November a weak, emaciated doe was captured at the Audubon Game Refuge and transported to Baton Rouge for examination.

The doe was moribund when presented for necropsy. The animal was heavily infested with biting lice. The blood was thin and watery. There was red marrow all through the femur and in the proximal part of the tibia. The more distal marrow was yellow and gelatinous. Body fat was almost entirely depleted. There was a pronounced serous atrophy of cardiac and mesenteric adipose tissue. The kidneys and liver were pale. The liver was quite small with a surface that appeared dull and somewhat granular as compared to the smooth glistening surface of the liver of a freshly killed, healthy animal. The lungs were grossly normal except for a moderate amount of hypostatic congestion. A few adult lung worms were found in the bronchi. The doe was not pregnant. Her age was estimated to be 9 years.

A few days later two more adult female deer were received from the Audubon Refuge. They were anemic and

heavily infested with biting lice, but less emaciated than the doe previously examined. Gross lesions observed at necropsy were similar to those seen in the 9 year old doe except that serous atrophy of fat was less intense and livers and lungs appeared normal. No lungworms were observed. A few meningioworms, *Pneumonstrongylus tenuis*, were found in the cranial cavity of each of the two does. One was 2 years old and barren. The other was 4 years old and had a mid-term fetus in the uterus.

Tissue specimens from the three deer were fixed in formalin and processed for microscopic observation. The most significant lesions were found in liver sections. Hypertrophy of hepatocytes (megalocytosis) in the liver of the 9 year old doe was most impressive. Nuclei of affected cells were up to 25 microns in diameter as compared to diameters of 5 to 9 microns for nuclei of normal cells. The largest cells were at the periphery of the lobules (Figure 1). In some lobules all cells appeared to be affected. In most cells the nuclear membranes stained heavily, as most of the chromatin was concentrated near the membrane. Nucleoli were also enlarged, near the nuclear membrane and almost always single. Some hepatocytes had discrete, acidophilic cytoplasmic globules up to 5

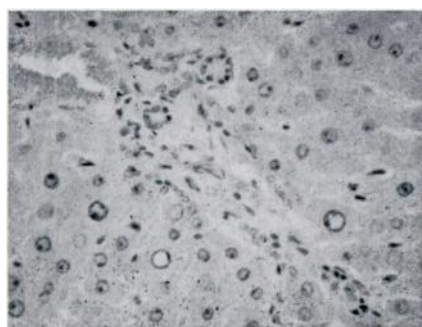


FIGURE 1. *Hypertrophied hepatocytes at periphery of lobules around portal space in liver of 9-year-old doe.*  
H. & E. X 300.

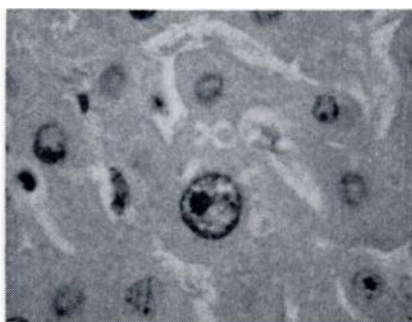


FIGURE 2. *Megalocyte with enlarged nucleus and cytoplasmic globules.*  
H. & E. X 750.

microns in diameter. Each globule was enveloped in a clear halo (Figure 2). There was some fibroplasia of Glisson's capsule (Figure 3) and the portal triads but bile duct proliferation was minimal if present. Fibroplasia was not prominent in most areas. Necrosis was limited to individual hepatocytes. Liver sections were not obtained from the 2 year old doe. There were indications of early megalocytosis in liver sections of the 4 year old doe. There was considerable vacuolization of cytoplasm in centrilobular hepatocytes. Neither necrosis or fibroplasia was apparent. There were many larval lung worms present in lung sections of the two younger deer, but tissue reaction was limited to small foci of interstitial pneumonia.

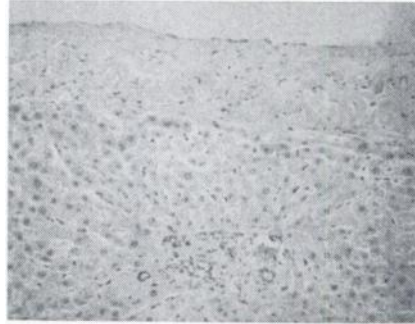


FIGURE 3. Fibroplasia of Glisson's capsule in liver of 9-year-old doe.  
H. & E. X 135.

#### Discussion

Hepatic megalocytosis is a characteristic reaction to intoxication with the pyrrolizidine alkaloids of plants of the genera *Crotalaria*, *Heliotropium* and *Senecio*. The alkaloids are most toxic for hepatocytes. Massive hepatic necrosis is produced at high dosage and megalocytosis at low dosage with the alkaloids. The plants are generally so unpalatable that they are seldom ingested in sufficient quantity to produce acute poisoning. Susceptibility of animals varies according to species, age, sex, nutritional status and stage of gestation. Among the domestic animals pigs and horses are more susceptible than cattle, while sheep are the least susceptible. The megalocytosis is apparently based on a permanent disturbance of cellular metabolism with the result that affected cells eventually die without regeneration and the liver becomes reduced in size. In some cases affected animals do not sicken or die until weeks or months after the last exposure to the poisonous plants (Jubb, K. V. F. and Kennedy, P. C., 1963, Pathology of Domestic Animals, Vol. 2, 191-192, Academic Press, New York and London.)

After the observation of the liver lesions characteristic of poisoning by pyrrolizidine alkaloids, the range at the Audubon Refuge was closely examined. Plants of the genera *Crotalaria* and *Heliotropium* were abundant and some *Senecio* were seen. There were some signs of ingestion of the plants by deer. Other forbs and palatable forages were very scarce. The few deer that were observed were in poor condition. The condition of the range was so poor that starvation was undoubtedly a major factor in the condition of the three deer that were examined. The observations reported here suggest that *Crotalaria* and *Heliotropium* poisoning may have been a contributing factor to the deer die-off. Such die-offs occur periodically and are often associated with prolonged dry weather. The Audubon Refuge is isolated from pollution by petroleum waste products and other major pollutants. No evidence was obtained that an infectious disease was involved. The liver lesions in the old doe almost exactly parallel those described for pyrrolizidine poisoning in sheep. Further investigation of this condition in deer is warranted.

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