2012-15-1 Ox Liver Eneku Wilfred
Bovine Pathology

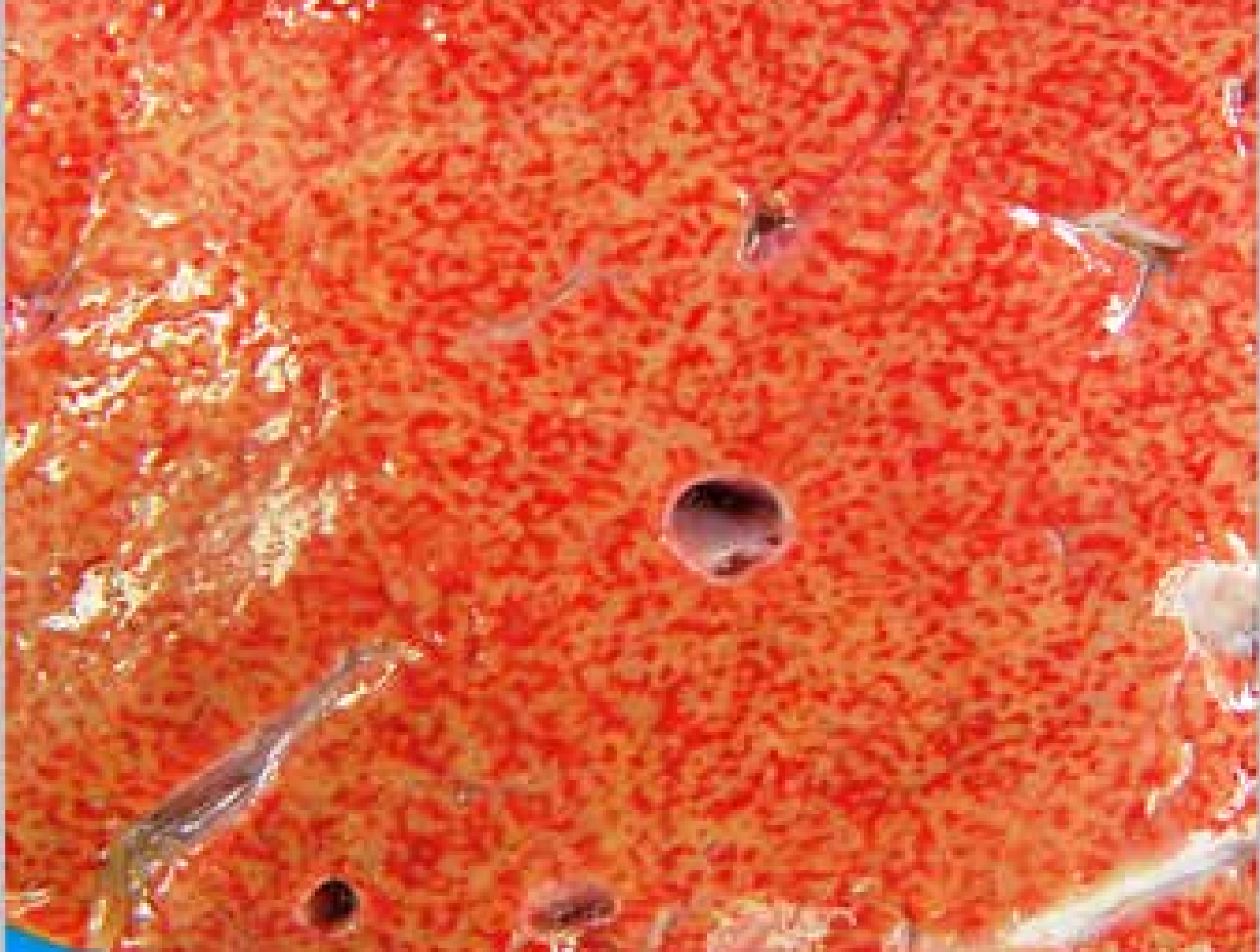
- **Contributor:** Departmento de Patologia, Universidade Federal de Santa Maria, RS, Brazil

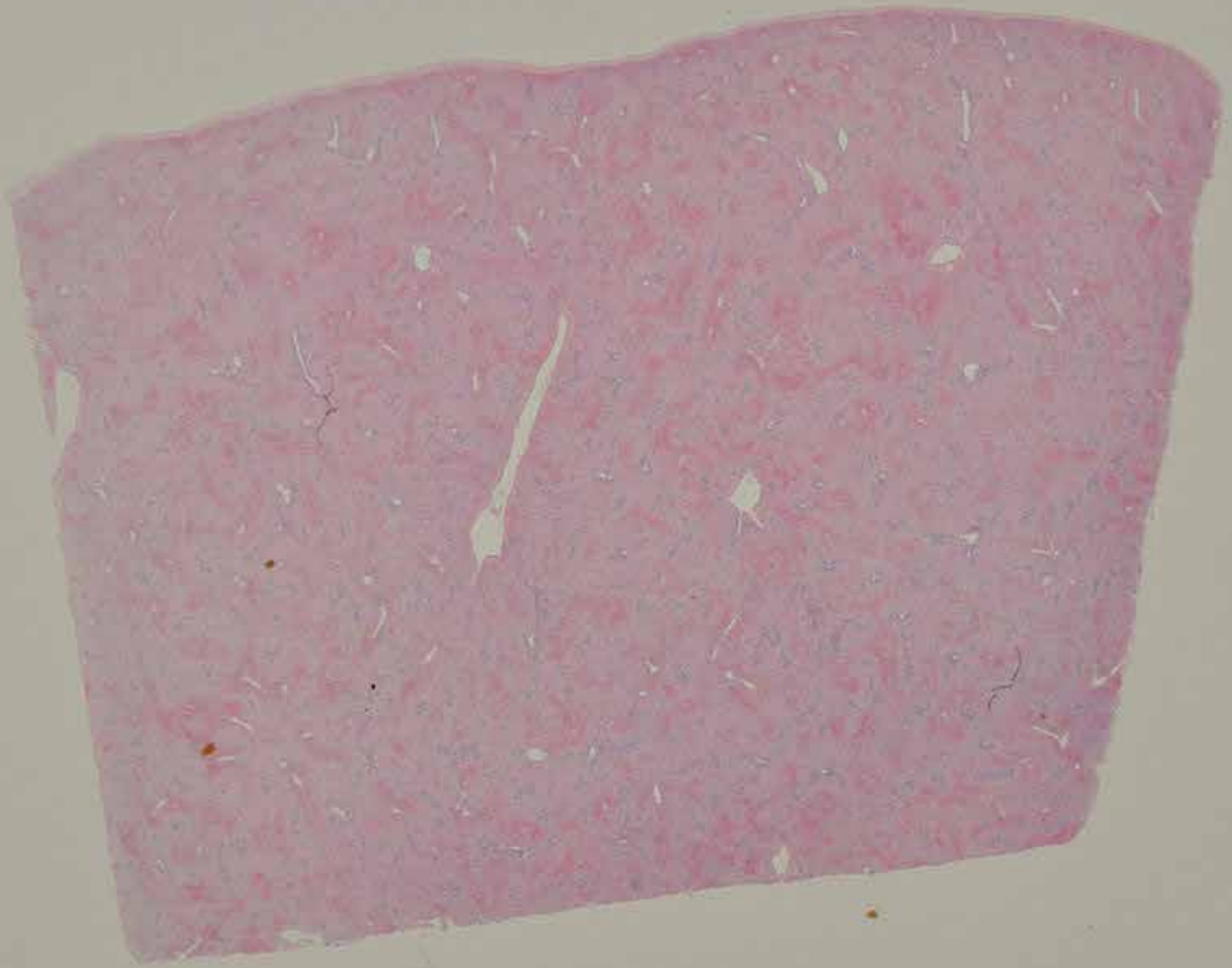
- **Signalment:** 18-month-old, female, mixed breed, bovine (*Bos taurus*)

- **History:** 16 out 200 yearlings in a farm in southern Brazil died in a winter (1 month period), from a disease with similar signs (morbidity rate of 0.8%, lethality rate of 100%). Clinical signs: weakness, muscular tremors, apathy and death within 1-5 days of the onset of clinical signs. Some animals showed neurological signs (agitation and aggressiveness) and those surviving for longer periods had icterus and occasionally photodermatitis. Very large numbers of 2-2.5 cm long, black insect larvae, identified as sawfly larvae, *Perreyia flavipes* , order Hymenoptera (Konow, 1899), were found closely packed on the pasture.

- **Gross Description:** Necrospy findings on one of the 16 dead calves which died within 24 hours of onset of clinical signs included ascites, petechiae (including subendocardial and subepicardial surfaces) and suffusion over the serosal surfaces of thoracic and abdominal cavities. The liver was enlarged with round edges and mottled (accentuation of the lobular pattern) best seen at the cut surface, findings consistent with hepatotoxin. There was edema of the gall bladder wall. Sawfly (*P. flavipes*) larval body fragments were found in the rumen.

- **Histopathologic Description:** The main microscopic lesion was restricted to the liver and consisted of centrilobular to massive hepatocellular necrosis with only a few viable hepatocytes left around portal triads. The lesion appeared diffusely and no preference for any hepatic lobe could be noticed. Hemorrhage occurred in centrilobular areas. Mild to moderate lymphocyte necrosis was seen in the splenic white pulp.

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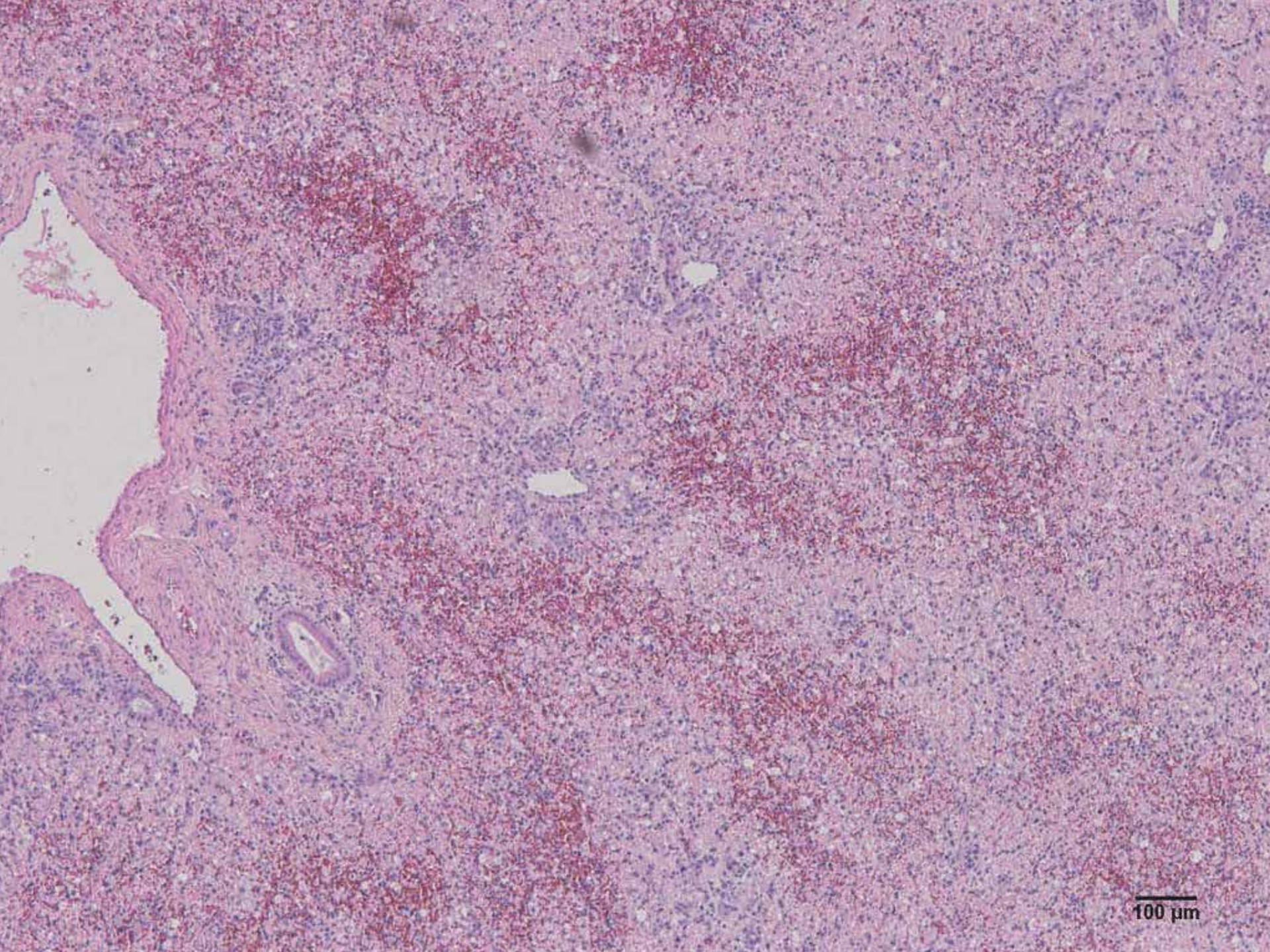
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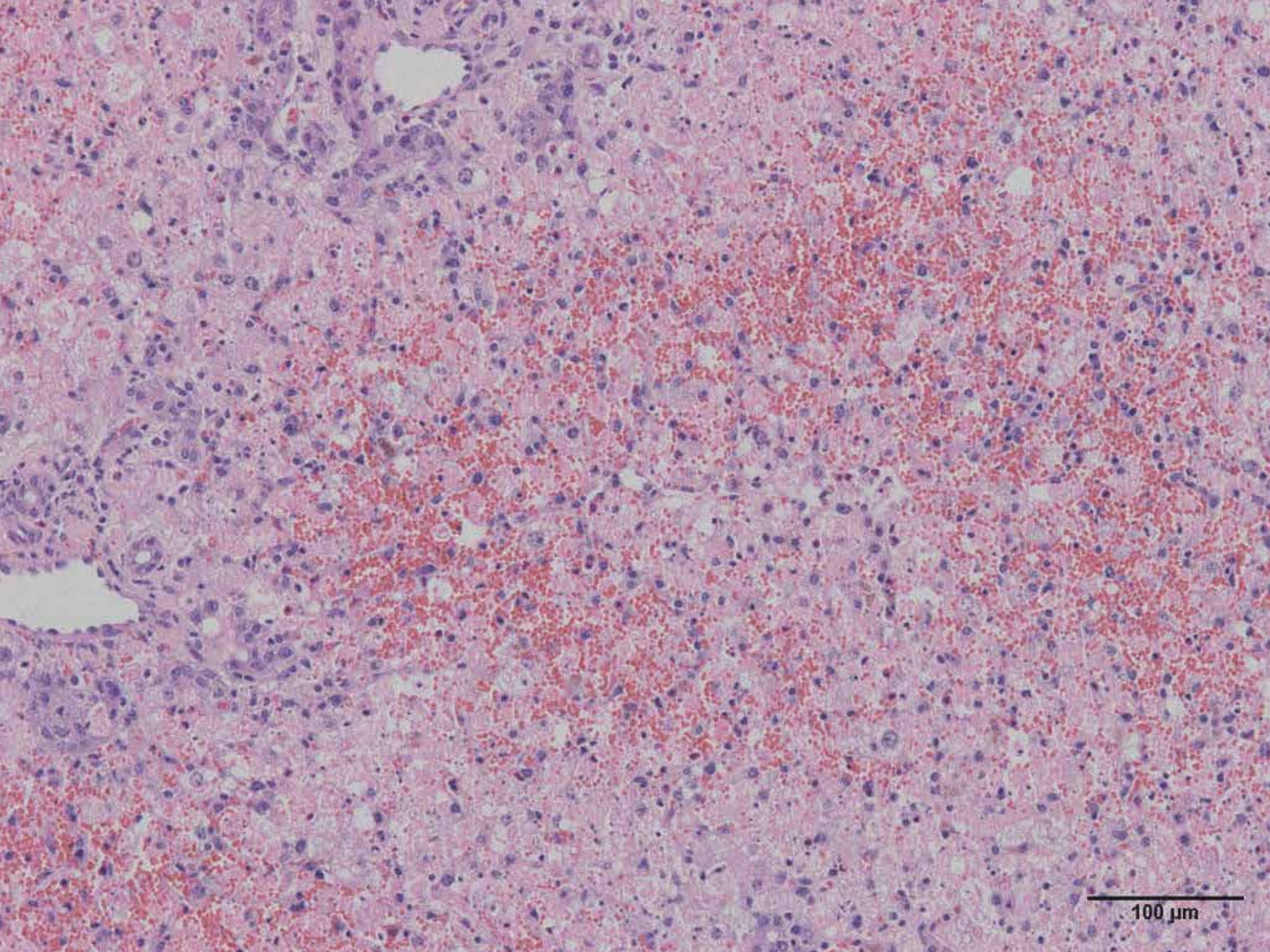
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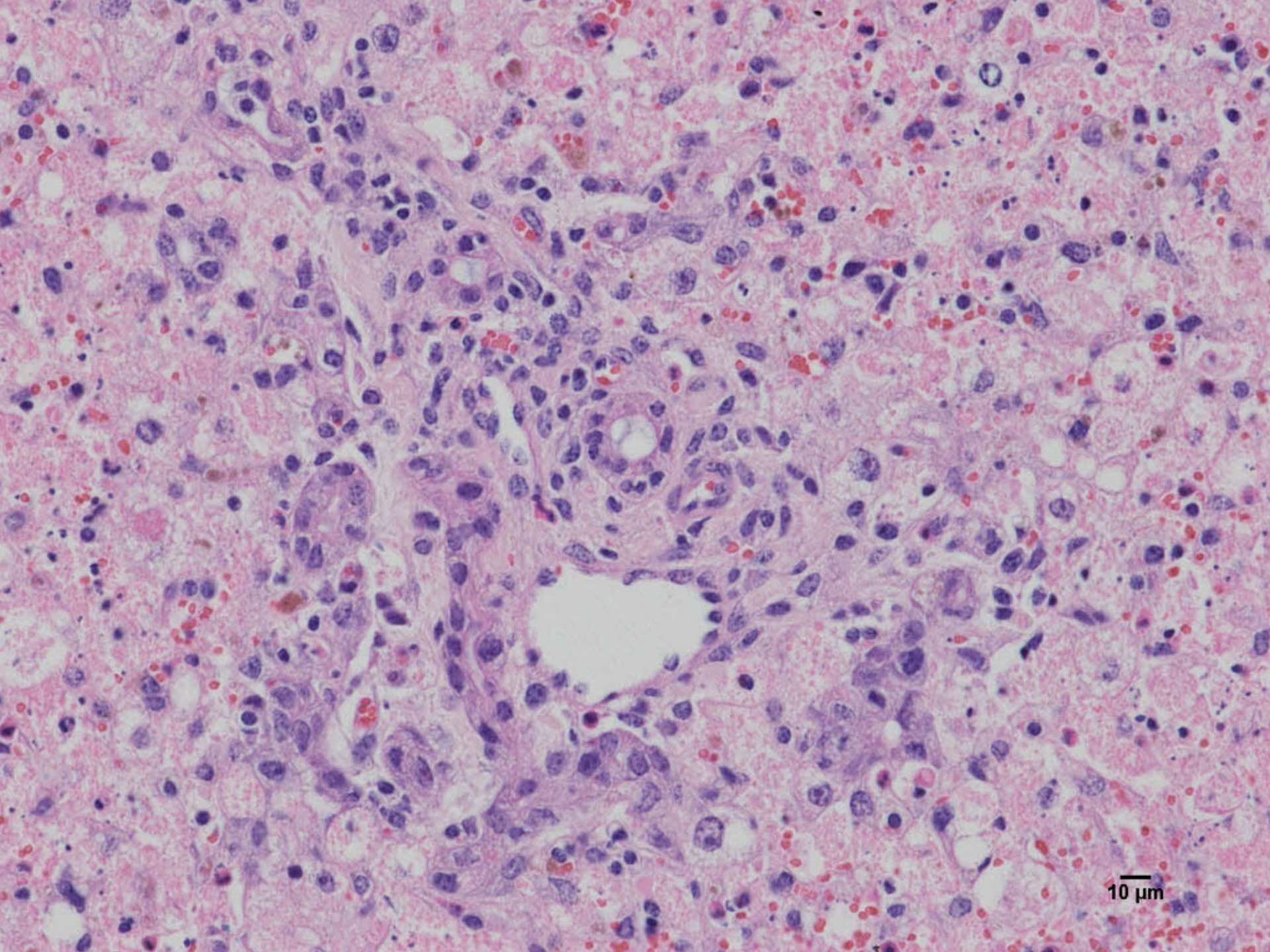
10 µm

- **Contributor's Morphologic Diagnosis:** Liver, centrilobular to massive hepatocellular necrosis, diffuse, acute, and severe.
  Etiologic diagnosis: Toxic hepatopathy
  Etiology: ingestion of sawfly (*Perreyia flavipes,*)

- **Contributors comment**: Sawfly larval poisoning (SLP) is an acute hepatotoxicity of cattle due to ingestion of larvae of sawfly insects (order *Hymenoptera).* SLP caused by various species of sawfly larvae has been described in cattle, sheep and pigs by various authors in Australia, Denmark and South America with one isolated report of SLP in a dog. The toxin (D-amino acid containing peptides) is present in the larvae of the insects with slight variation in chemical structure due to fly species in different geographical locations. Octapeptide lophyrotomin was the major toxin found in Australian and Danish sawflies while heptadecapeptide pergidin was the major toxin in South American sawflies. There is variation in mortality rates and economic losses due to SLP outbreaks. Lifecycle of the sawfly is all year round but the larvae emerge in pastures in late winter and early spring when animals ingest them. Why the cattle ingest the larvae is not known though attributed to some nutritional deficiency (Roberts 1932) and some unknown sawfly factors. The clinical signs observed in cattle with SLP include weakness, muscular tremors, apathy, stupor and death within 2-5 days of the onset of clinical signs. Some animals show neurological signs (agitation and aggressiveness) attributed to hepatic encephalopathy. Hepatogenous photodermatitis can be seen in cattle surviving for longer periods. Some less affected cattle may recover. Necropsy findings include accentuation of lobular hepatic pattern, edema of gall bladder and presence of larval fragments in the rumen and omasum. Centrilobular to massive liver necrosis and necrosis of lymphoid tissue is the main microscopic lesion. Diagnosis of this case was based on clinical signs, necropsy findings, experimental reproduction and some epidemiological aspects as acute centrilobular necrosis as seen associated with SLP is not specific. Other causes of acute hepatic necrosis in Brazil are plant toxins, myccotoxins, insect larvae and bacteria, *Microcystis aeruginosa.*

- **JPC Diagnosis:** Liver: Necrosis, massive, diffuse.
- JPC and contributor diagnoses were similar in distribution and severity

- **Conference Comment:** The contributor provides a very interesting and thorough discussion of sawfly larval poisoning. Conference participants discussed characteristics of the histological patterns of necrosis observed in acute toxicities such as this, noting that the patterns are very repetitive. Discussion focused on the extent of necrosis (centrilobular to massive) that is often a function of dose, as well as the presence of early ductular reaction that often occurs in response to hepatic damage. Ductular reaction is the phenomenon in which biprogenitor cells (cells that have the propensity to differentiate into either biliary epithelial cells or hepatocytes) proliferate in response to severe hepatic injury or nutritional deficits to form islands or small, crude tubules of small basophilic cells at the margin of the limiting plate. Ductular reaction is considered to be the hallmark of severe injury and may occur as early as 2-3 days after the toxic insult.

  Additionally, participants discussed the various toxins that can result in similar lesions of acute hepatic necrosis.

Various toxins that can result in similar lesions of acute hepatic necrosis in cattle include:

Name	Toxic Principle
Blue-green algae	Microcystin-LR
Mushrooms: Amanita, Phalloides and others	Amatoxins
Cycads (Zamia sp.)Cycads (Zamia sp.)	Methylazoxymethanol
Solanacae (Cestrum sp.)	Atractyloside
Compositae (Xanthium-cockleburr)	Carboxyatractyloside
Ulmaceae (Trema sp.-Poison peach)	Trematoxin
Myoporacae (Myoporum)	Ngaione (periportal)
Iron	
Sawfly larvae (Lophyrotoma sp.)	Lophyrotomin/pergidin

Source: Conference moderator