

# Gastrointestinal and Hepatic Toxicities

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# Gastrointestinal Toxicities

## PROBLEMS:

- Vomiting
- Abdominal pain
- Anorexia
- Salivation
- $\pm$  Diarrhoea

# Gastrointestinal Toxicities

## Differential diagnoses:

- Metals: arsenic, copper, lead, zinc
- Cholecalciferol
- Fertiliser
- Garbage ingestion

# Gastrointestinal Toxicities

## Differential diagnoses:

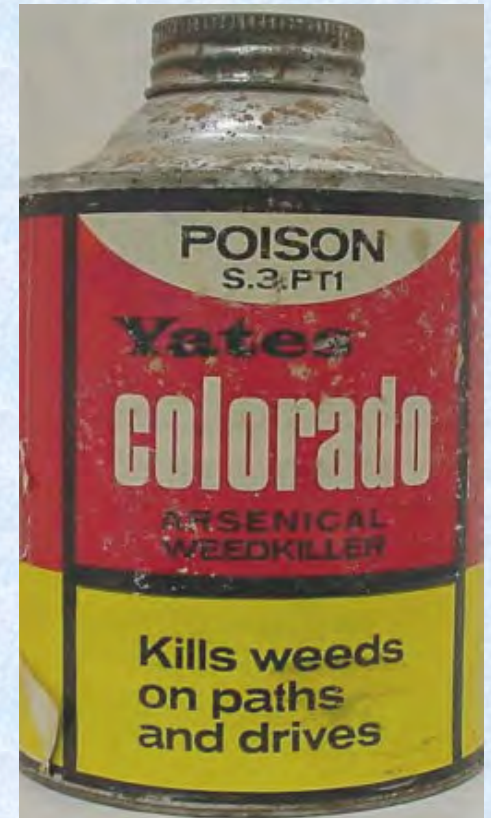
- Organophosphates and carbamates
- NSAIDs
- Paracetamol
- Phosphorised pesticides



# Gastrointestinal Toxicities

## ARSENIC SOURCES

- Pesticides
- Peltex treatment of pelts
- Dips and orchard sprays
- Arsanilic acid (feed additive)



Sodium arsenite

# Gastrointestinal Toxicities

## ARSENIC SOURCES

- Tanalised wood





# Gastrointestinal Toxicities

## ARSENIC-ORAL

- Intense abdominal pain
- Thirsty
- Salivation
- Vomiting
- Staggering gait

# Gastrointestinal Toxicities

## ARSENIC-ORAL

- Weakness
- Diarrhoea
- Prostration
- Hypothermia



# Gastrointestinal Toxicities

## ARSENILIC ACID - PIGS

- Ataxia
- incoordination
- torticollis
- blindness
- sitting dog stance

# Gastrointestinal Toxicities

## ARSENIC-DERMAL

- Dermal Necrosis
- Dermal sloughing
- Systemic signs
  - listlessness, anorexia
  - soft faeces, rough coat

# Gastrointestinal Toxicities

## ARSENIC TREATMENT

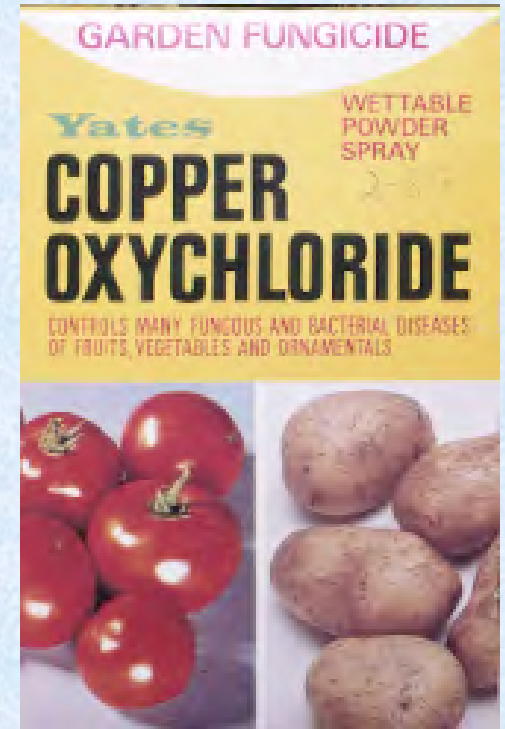
- Chelation therapy
  - British Anti-Lewisite (BAL)
  - Succimer dimercaptosuccinic acid (DMSA)
- Intensive supportive care
  - Fluids



# Gastrointestinal Toxicities

## COPPER SOURCES

- Pesticides
  - Dips and orchard sprays
- Supplements (Oral & Injectables)



# Gastrointestinal Toxicities

## COPPER Toxicity

- Excess copper causes:
  - Haemolysis (oxidises RBCs)
  - Hepatocellular necrosis
  - Haemoglobinuria (red urine)

# Gastrointestinal Toxicities

## COPPER Clinical Signs:

- Abdominal pain & GI haemorrhage
- Thirst
- Salivation
- Vomiting
- Staggering gait
- Weak rapid pulse



# Gastrointestinal Toxicities

## COPPER Clinical Signs:

- Pale mucous membranes or jaundice
- Diarrhoea
- Prostration
- $\pm$  Hypothermia



Pale mucous  
membranes



# Gastrointestinal Toxicities

## COPPER Post mortem:

- Urine-Haematuria
- Liver-Swollen, bronze, nutmeg
- Kidneys-metallic sheen
- $\pm$  Jaundice
- Gastroenteritis





# Gastrointestinal Toxicities

## COPPER TREATMENT

- $\pm$  Chelation therapy
  - D-Penicillamine
- Supportive care
  - Fluids
  - Molybdenum and sulphate
    - bind to copper (gypsum  $\text{CaSO}_4$ )

# COPPER Key Points:

- Sheep and calves
- Acute vs subacute vs chronic
- Haemolytic crisis (chronic)
- Liver enzyme  $\uparrow$  AST
- Copper levels in liver (?), kidney
- Prostration
- Metallic (gun metal) sheen to kidneys

# Gastrointestinal Toxicities

## ZINC Sources

- Facial eczema prophylaxis
- Galvanised metal fence, pipes
- Paints and zinc batteries





# Gastrointestinal Toxicities

## ZINC Sources

- Footrot baths
- Facial Eczema treatment cattle



# ZINC

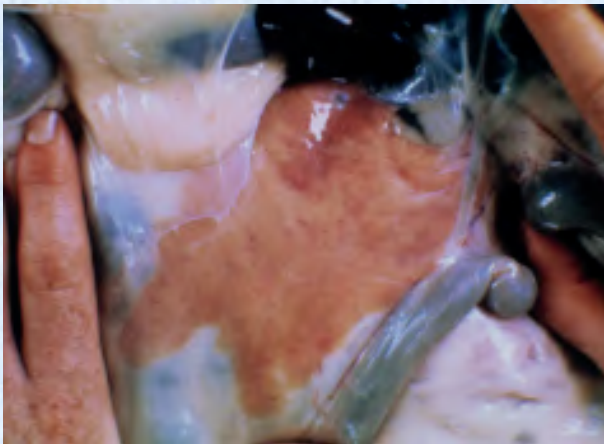
- Vomiting
- Abdominal pain
- Dehydration
- Decreased production (e.g. milk)
- GI bleeding
- Haemolysis and haematuria  
(monogastrics)



# Gastrointestinal Toxicities

## ZINC Diagnosis

- Post mortem pancreas & abomasum
  - abomasal oedema
  - abomasal necrosis
  - fibrotic pancreas





# Gastrointestinal Toxicities

## ZINC Diagnosis

Post mortem

Haemolytic crisis



Serum and Tissue zinc levels

(eg pancreas, liver, kidney)

# Gastrointestinal Toxicities

## ZINC TREATMENT

- Remove zinc
- Chelate zinc with baking soda, egg white and tannic acid
- Symptomatic and supportive care

- ± Chelation therapy e.g. BAL, CaEDTA
  - of questionable value in zinc toxicity but effective in birds





# Gastrointestinal Toxicities

## PHOSPHORISED PESTICIDES

### Sources:

- Pesticide Use
  - White or yellow phosphorus
  - Toxicity - lethal dose:
    - rabbit 4 mg/kg, possum 6-10 mg/kg
    - dog < 1 mg/kg

# Gastrointestinal Toxicities

## PHOSPHORISED PESTICIDES

### Toxicity

- Phosphorus oxidised to phosphate
- Protoplasmic poison
  - Extensive injury to organs and tissues
  - Strong irritant
  - damages hepatic cells - periportal

# Gastrointestinal-Hepatic Toxicities

## PHOSPHORISED PESTICIDES

### Clinical Signs:

- Luminous vomit (+ garlic odour)
- Abdominal pain, Anorexia
- Haemorrhagic gastroenteritis
- Liver failure (latent phase)



# Gastrointestinal Toxicities

## PHOSPHORISED PESTICIDES

### Clinical Signs/Effects

- Hypoprothrombinaemia
- Delayed photosensitivity in ruminants
- Hepatic and renal damage
- Oliguria

# Gastrointestinal-Hepatic Toxicities

## PHOSPHORISED PESTICIDES

- Clinical Pathology
  - Increase in liver enzymes
  - Increase in BUN (blood urea nitrogen)
  - Hypoglycaemia
  - Haematuria, albuminuria

# Gastrointestinal-Hepatic Toxicities

## PHOSPHORISED PESTICIDES

- Postmortem changes in liver
  - fatty degeneration
- Gastrointestinal irritation
  - haemorrhage, necrosis
- Renal tubular necrosis



# Gastrointestinal Toxicities

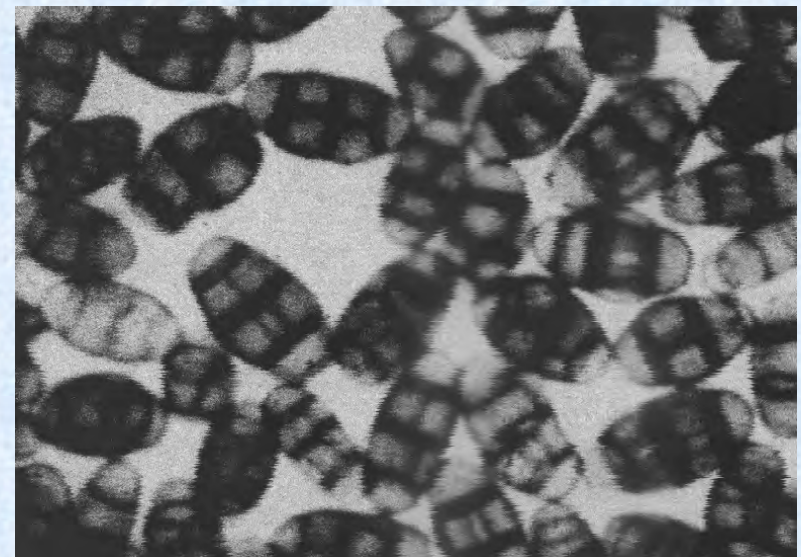
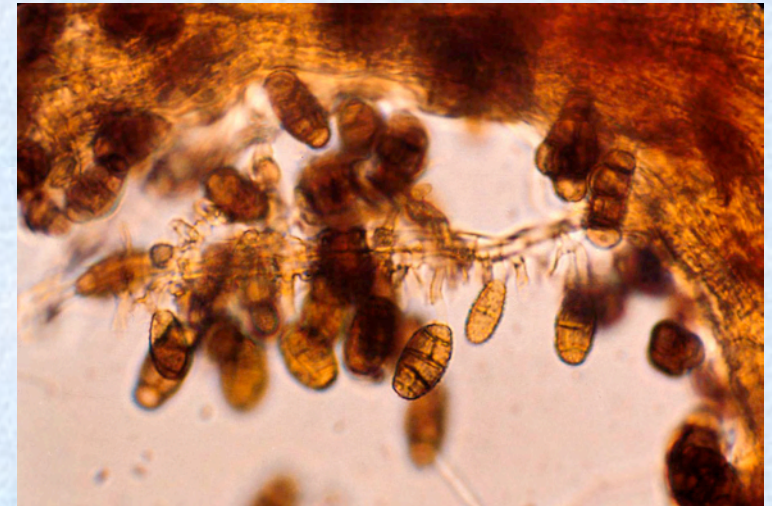
## PHOSPHORISED PESTICIDES TREATMENT

- Early-copper sulphate 1%
- Symptomatic and supportive care
- DO NOT give Oils

# Hepatic Toxicities

## FACIAL ECZEMA

- *Pithomyces chartarum*
  - renamed as *Leptosphaerulina chartarum*
  - Sporidesmin toxin
- Ryegrass pastures



# Hepatic Toxicities

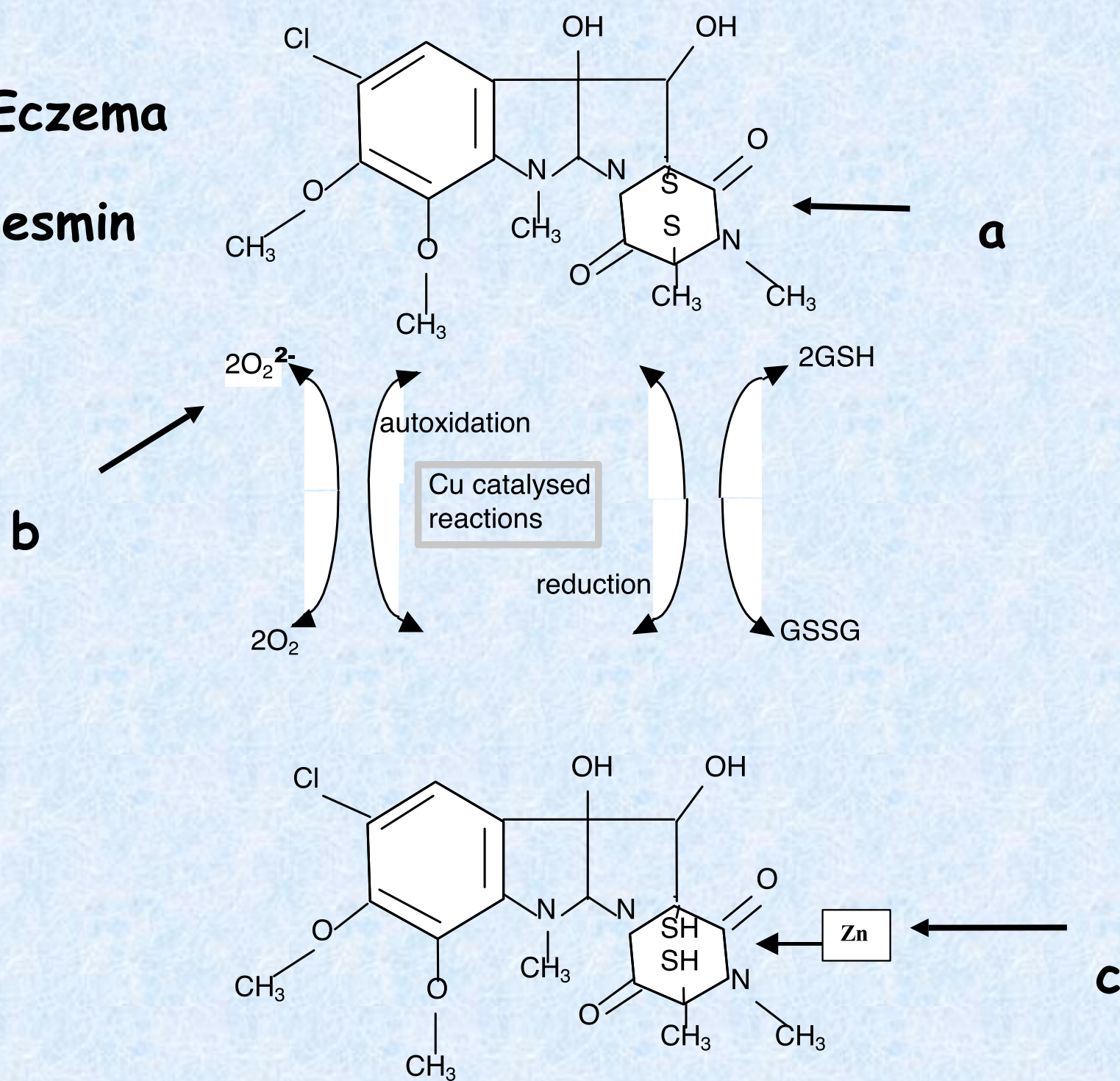
## FACIAL ECZEMA

- Mechanism of action
  - Cycle of oxidation and reduction
  - Superoxide radicals form
  - Hepatic ductular epithelium injury
  - Biliary system obstruction  
(pericholangitis)



# Facial Eczema

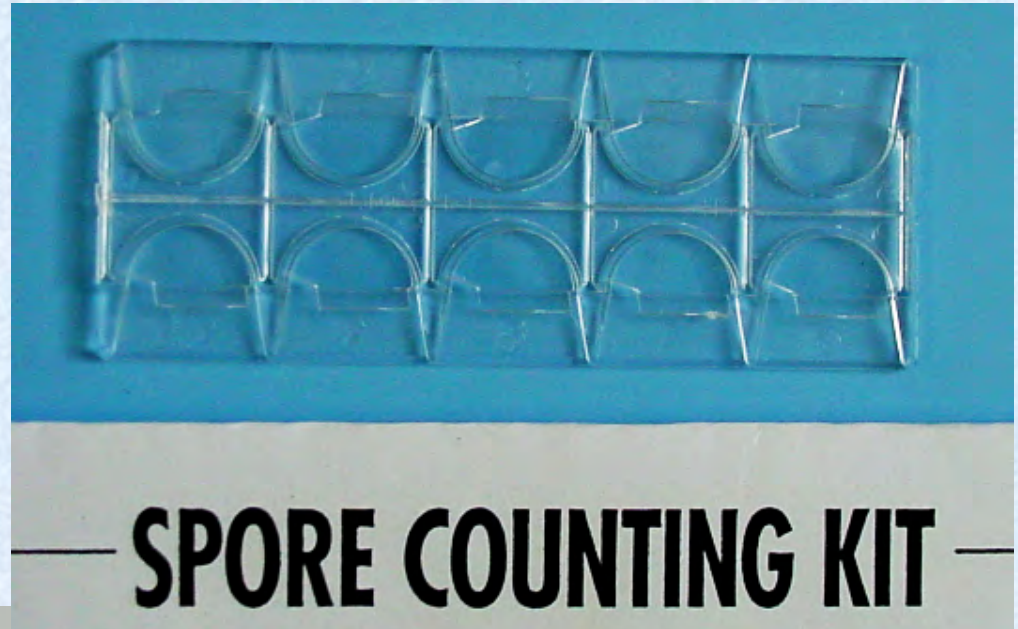
## sporidesmin



# Hepatic Toxicities

## FACIAL ECZEMA

- Monitoring
- Spore counts



### PRODUCTS REQUIRED:

Use Shoof monocular microscope

Shoof code: MXJX14

with 5 X eyepiece = 80 X mag.

Spore Counting Kit -5 pack

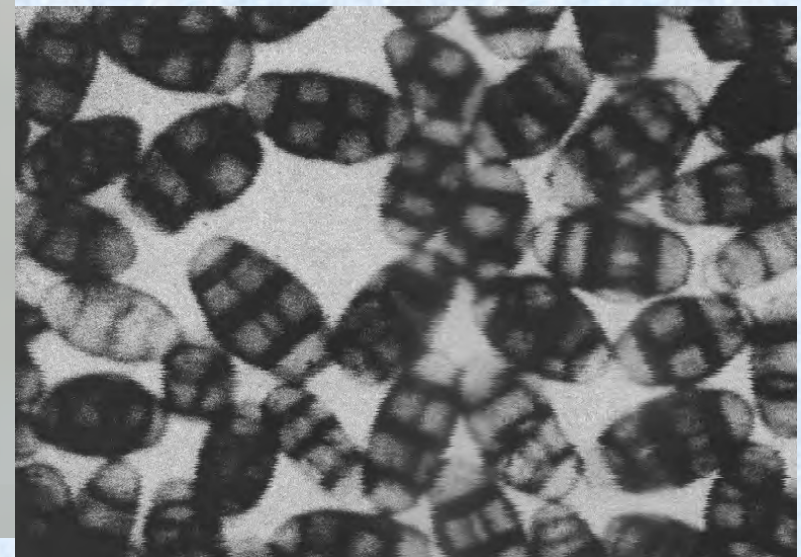
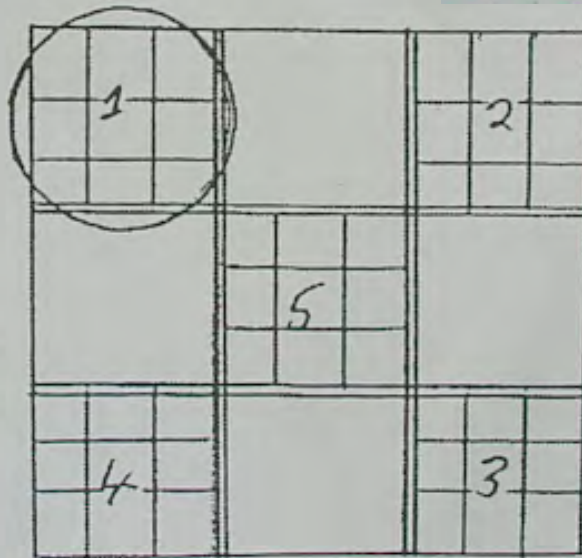
Shoof code: SCK5

Count corner and centre squares.

The small grid lines within the squares are to help counting only. In other words count all spores in the field of view. (see 1.)



Facial eczema spores look like miniature hand grenades!





# Hepatic Toxicities

## FACIAL ECZEMA

- Post mortem changes
  - boxing glove liver





# Hepatic Toxicities

## FACIAL ECZEMA PREVENTION

- Breed for resistance
- Pretreat with zinc
- Pasture treatment with fungicides
- Treatment-Symptomatic

# Gastrointestinal-Hepatic Toxicities

## PARACETAMOL

- Depletes glutathione
- Oxidative injury
  - dogs-liver
  - cats-RBCs

# Gastrointestinal-Hepatic Toxicities

## PARACETAMOL-DOGS

Also known as ACETAMINOPHEN

- Vomiting, Anorexia
- Tachycardia, Tachypnoea
- Abdominal pain
- $\pm$  Methaemoglobinaemia
- Facial and paw oedema



# Gastrointestinal-Hepatic Toxicities

## PARACETAMOL-DOGS

- Acute hepatic centrilobular necrosis
  - 24-36 hours post ingestion
- \* Not known to cause renal injury in dogs and cats but reported in humans

# Gastrointestinal-Hepatic Toxicities

## PARACETAMOL-CATS

- Cyanosis
- Vomiting
- Dyspnoea
- Oedema, face + paws



# Gastrointestinal-Hepatic Toxicities

## PARACETAMOL-CATS

- Methaemoglobinaemia,
  - Heinz body anaemia
- Hypothermia
- Depression



# Gastrointestinal-Hepatic Toxicities

## PARACETAMOL TREATMENT

- Symptomatic and supportive care
- N-acetylcysteine (Parvolex)
- Methaemoglobinaemia
  - Methylene blue or ascorbic acid

# Gastrointestinal-Hepatic Toxicities

## SUMMARY

- Phosphorus
  - Luminous vomit
- Chelation therapy
  - arsenic, copper,  $\pm$  zinc
- Paracetamol
  - Face and paw oedema

# Gastrointestinal-Hepatic Toxicities

## SUMMARY

- Facial Eczema
  - Photosensitisation
  - Boxing glove liver
- Zinc
  - Oedematous or fibrotic pancreas



# Gastrointestinal-Hepatic Toxicities

## BLUE-GREEN ALGAE

microcystins and nodularin

- Weakness
- Vomiting
- Diarrhoea
- Depression
- Hepatic necrosis



# Gastrointestinal-Hepatic Toxicities

## BLUE-GREEN ALGAE TREATMENT

- Symptomatic and Supportive care