Pythiosis
Synonyms: bursatii, Florida horse leeches, granular dermatitis, hyphomycosis, destruens equi, phycomycosis, phycomycotic granuloma, and swamp cancer

Definition
0. Chronic cutaneous-subcutaneous disease of humans and animals (horses, cats, cattle, and dogs).
   0. Causative agent: *Pythium insidiosum* (*aquatic fungus-like organism*)
   0. Kingdom: Straminipila; Phylum: Oomycota; Family: Pythiaceae; Genus: *Pythium*; Species: *insidiosum*

Definition (contd.)
0. 120 known species
   0. Mostly soil inhabitants, though some are important plant pathogens
   0. First reports published in the mid to late 1800s
   0. Associated with lesions in horses
   0. Varying nomenclature until *pythium insidiosum* in 1987.

Case Study 1: Canine Pythiosis
0. *Mycopathologia* (2005) 159: 219-222
0. Intestinal canine pytthiosis (Venezuela)
0. 11-months old Terrier male.
0. Symptoms: depression, anorexia, vomiting, diarrhea
0. Illness began 1 month earlier.
0. Initial treatment: antibiotic chemotherapy and vitamins.

Case Study 1 (Contd.)
0. Radiological exams, histopathological studies
   0. Abundant eosinophils, histiocytes, and giant cells.
   0. Cross sections of small intestine (silver stained)
      0. Sparsely septate hyphae within necrotic areas.
   0. Unable to isolate the etiologic agent in pure culture.
   0. Canine died with no definitive diagnosis

Case Study 1 (Contd.)
0. Continued lab assessment
0. Fluorescent antibodies and molecular tools (for pythiosis)
   0. Confirmed *P. Insidiosum* as the etiologic agent.

**Case Study 2 : Human Pythiosis**

0. Human Pythiosis (Brazil)
0. May 2002- 49 yr old Policeman.
0. Skin lesion on leg.
   0. 3 months ago:
      0. a small pustule developed on left leg
      0. 1 week earlier- fishing in a lake.
   0. Prior diagnosis: bacterial cellulitis
   0. Treated with intravenous antimicrobial agents (no improvement)

0. Initial Diagnosis: cutaneous zygomycosis

**Case Study 2: Human Pythiosis (Contd.)**

0. Biopsy
   0. Suppurative granulomatous inflammation
   0. Several non-septated hyphae.

0. Change in Treatment
   0. Amphotericin B (575 mg)
   0. 2 surgical debridement
      0. Only slight improvement.

**Case Study 2: Human Pythiosis (Contd.)**

0. Further testing pursued at a new hospital.
0. Physical examination:
   0. Tibial ulcer (15 cm) with an infiltrating and nodular proximal border.

0. Serological Testing
   0. Leukocytes count
      0. 4,200/mm$^3$
   0. 9 % eosinophils
   0. Negative for HIV

**Case Study 2: Human Pythiosis (Contd.)**

0. Side Effects from Amphotericin B
   0. Hypokalmenia, nomocytic anemia.
   0. Second biopsy: again indicative of zygomycosis.

0. Treatment
0. Oral Itraconazole (400 mg/day) 
   0. Encouraging, but lesions recurred after first month 
0. Potassium Iodine (4g/da) 
   0. No improvement after 2 months 
0. Attempts to isolate agent not successful 
0. Amphotericin B 1 week before intervention 
   0. Total removal of the fascia lata. 
   0. Day 103 – discharge from hospital (Amphotericin B contd.) 
0. Late skin graft provided acceptable recovery. 

**Case Study 2: Human Pythiosis (Contd.)** 
0. Lab Investigation of the excised tissue. 
   0. DNA extraction, sequencing, and submitted to GenBank 
   0. Pure, colorless, membranous colonies 
   0. Stained with lactophenol cotton blue – broad, branched, and sparsely septated hyphae without fruiting bodies. 
0. Finally, confirmed as *P. Insidiosum.*

**Presentation of Disease**
0. General symptoms include invasion of: 
   0. superficial layers of the eye (keratitis), 
   0. cutaneous and sub-cutaneous tissue, 
   0. arteries (disseminated arterial pythiosis), 
   0. intestines. 
0. Animals 
   0. Cutaneous, sub-cutaneous lesions, 
   0. Intestinal disease 
   0. Ulcerative, proliferative, pyogranulomatous lesion (leg, ventral body wall) [horses] 
   0. Also may affect lung, bone, and intestine. [horses] 
   0. Invasion of nasal cavity, skin [Felines] 
0. Humans 
   0. No immunologic disorders, 
   0. no clinical manifestation of thalassemia, 
   0. skin lesions. 

**Histopathology**
0. Thickening and stenosis; detected in X-rays 
   0. Tumor-like mass 
   0. Multifocal eosinophilic necrotic areas with histiocytes, eosinophils and giant cells
0. Mucosal ulceration and deformation of the submucosa, muscularis layers and the serosal surface
0. No hyphal elements in slide sections with H&E stain
0. GMS: 4-8 um septate hyphal elements in the center of eosinophilic areas
0. Isolation possible with fluorescent antibodies specific to *P. insidiosum*
0. Genomic DNA analyzed (SSU rDNA) and amplified via PCR

Laboratory Aspects

0. Characterized by
  0. Eosinophils
  0. Giant cells
  0. Histiocytes
0. Hard to isolate with H & E and other conventional staining procedures
0. Colonies
  0. Can be cultured on Sabouraud dextrose (and PDA – potato dextrose agar) or brain heart infusion agar
  0. Optimally at 37 degrees Celsius
  0. from clinical material such as pus, lesion exudates, and biopsy material
  0. Pure, colorless, membranous colonies
0. Successful staining with GMS (Lactophenol Cotton-Blue) and periodic acid-Schiff stain
  0. Broad, branched, septated hyphae without fruiting bodies

Epidemiology and Ecology

- Occurs in tropical, sub-tropical, and temperate areas.
  - Argentina, Australia, Brazil, Columbia, Costa Rica, Egypt, Greece, Haiti, India, Indonesia, Japan, Papua New Guinea, Thailand, and the USA.
  - Reported in the USA (Florida, Texas, Louisiana).
0. Predisposing factors:
  0. Young age (less than 3 months)
  0. Male (Canines)
  0. Living outdoors.
  0. Hunting in stagnating water.
  0. Large sized breeds.

Treatment and Prevention

0. Antifungal interventions: Itraconazole, Potassium Iodine, Liposomal Nystatin (Nyotran), and Amphotericin B
0. Physical interventions: Amputation (removal of limb or lymph nodes)
0. Pythium vaccine protocol
0. Prevention
   0. Poor prognosis
   0. Avoid stagnating water in risk-prone areas.

References