

Case 1. Tissue from an ox.

**MICROSCOPIC DESCRIPTION:** Haired skin: Diffusely expanding the superficial and deep dermis **(1pt)** are numerous, closely apposed, round apicomplexan **(1pt)** cysts **(1pt)** measuring 250-400 um **(1pt)** in diameter, which often effaces normal dermal structures and adnexa. Cysts have a 10-30 um thick, hyaline pink fibrous capsule **(1pt)** that surrounds a 5-10 um thick rim of host cell cytoplasm **(1pt)** with multiple enlarged but flattened nuclei **(1pt)** which in turn surround a parasitophorous vacuole containing numerous, densely packed crescentic 3-5 um bradyzoites **(1pt)**. Between cysts, the dermis is infiltrated by moderate numbers of plasma cells **(1pt)** and fewer lymphocytes **(1pt)**, histiocytes, and eosinophils, with rare multinucleated foreign body type macrophages. Rarely within the superficial dermis, cysts are ruptured, devoid of bradyzoites, and contain low to moderate number numbers of macrophages and lymphocytes. **(1pt)** Keratinocytes within the stratum spongiosum are multifocally expanded by intracellular edema, and rarely exhibit apoptosis. **(1pt)** There is diffuse epidermal hyperplasia and orthokeratotic hyperkeratosis. **(1pt)**

**MORPHOLOGIC DIAGNOSIS:** Haired skin: Dermatitis, lymphohistiocytic **(1pt)**, and eosinophilic, diffuse, moderate, with numerous apicomplexan cysts **(1pt)** and mild diffuse epidermal hyperplasia and hyperkeratosis. **(1pt)**

CAUSE: *Besnoitia besnoiti* **(3pt)**

O/C: **(1pt)**

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Case 2. Tissue from a cat. (This is a contributor-submitted digital slide, and no additional slides were submitted. The stain is intensely red, which makes the precise identification of some characteristics, such as the identity of inflammatory cells somewhat problematic. It is a great lesions, however,)

**MICROSCOPIC DESCRIPTION:** Haired skin: There is multifocal to coalescing full-thickness **(1pt)** necrosis **(1pt)** of the superficial epidermis; in some areas the basal keratinocytes of elongate rete ridges is spared **(1pt)**. The epidermis is replaced by necrotic keratinocytes, large amounts of cellular debris, hemorrhage, edema fluid, and fibrin, and covered by a serosa cellular crust. **(1pt)** At one edge of the section, the intercellular space is expanded by confluent pools of a serous exudate and hemorrhage and lined by pyknotic keratinocytes. **(1pt)** Keratinocytes remaining within the epidermal and outer root sheath epithelium are often expanded by abundant intracellular edema **(1pt)** (ballooning degeneration) **(1pt)** and their cytoplasm **(1pt)** contains one or more 2 to 6  $\mu$  **(1pt)** polygonal eosinophilic viral inclusions. **(1pt)** Multinucleated syncytial epithelial cells are common **(1pt)**. Similar changes are seen within sebaceous epithelium. **(1pt)** The dermis is expanded by an infiltrate of large numbers of viable and degenerating neutrophils **(1pt)** fewer macrophages and rare lymphocytes and plasma cells which are admixed with abundant hemorrhage, edema, and polymerized fibrin, and large amounts of cellular debris. **(1pt)**

**MORPHOLOGIC DIAGNOSIS:** Haired skin: Dermatitis, necrotizing **(1pt)**, diffuse, severe with epithelial ballooning degeneration **(1pt)**, syncytia formation and numerous intracytoplasmic viral inclusions **(1pt)**.

**CAUSE:** Cowpox virus **(2pt)**

**O/C:** **(1pt)**

Case 3. Tissue from a cat.

MORPHOLOGIC DESCRIPTION: Haired skin: Centrally within the section, the epidermis is diffusely and markedly thickened **(1pt)** by a poorly demarcated, moderately cellular, unencapsulated, verrucous, and expansile intraepidermal neoplasm **(2pt)** which extends into the outer root **(1pt)** sheath of underlying hair follicles. Within this area, the epidermis is expanded up to 8-10 cell layers **(1pt)** thick by a relatively monomorphic population of cells which does not display normal maturation, **(1pt)** and forms nodular rete pegs **(1pt)** which are constrained by a basement membrane. **(1pt)** Epithelial cells within all levels of the proliferating epidermis have a monomorphic appearance, have abundant eosinophilic cytoplasm which occasionally contains melanin granules (hyperpigmentation)**(1pt)**. Nuclei are large, with prominent nucleoli, and are often hyperchromatic within deeper layers. **(1pt)** Mitotic figures are present within all levels of the epidermis. **(1pt)** Keratohyalin granules are markedly diminished. **(1pt)** Hair follicles within the lesion may be devoid of hair shafts and contain variable amounts of keratin debris as well as cocci. The dysplastic epithelium is multifocally eroded **(1pt)** with a serocellular and hemorrhagic crust, infiltrated by low numbers of neutrophils, and in these areas, dysplastic/neoplastic epithelial cells are markedly expanded by intracellular edema **(1pt)** to variable depths. At the periphery of the lesions, similar but less severe dysplastic lesions are seen, with diminishing size of rete ridges and a re-establishment of normal maturation. **(1pt)** The superficial dermis is markedly expanded by congested vessels, numerous viable and degenerate neutrophils **(1pt)** (also in perifollicular and periadnexal locations), cellular debris, and variable amounts of hemorrhage, edema, and polymerized fibrin. There is multifocal fibrosis and neovascularization within the superficial dermis. Mast cells are numerous and prominent in the superficial dermis.

MICROSCOPIC DIAGNOSIS: Haired skin: Bowenoid squamous cell carcinoma *in situ* **(3pt)**

Name a likely associated pathogen: Feline papillomavirus **(1pt)**

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Case 4. Tissue from a cat.

**MICROSCOPIC DESCRIPTION:** Gingiva **(1pt.)**: The extensively ulcerated gingiva is markedly expanded by numerous short streams and bundles **(1pt.)** of interlacing fibroblasts **(2pt.)** with a moderate amount finely granular basophilic cytoplasm which largely effaces **(1pt.)** pre-existent submucosal tissue. Nuclei **(1pt.)** are irregularly round to oval with finely stippled chromatin and one to prominent basophilic nucleoli, and mitotic figures are common. Scattered throughout the mass are numerous multinucleated **(1pt.)** polygonal **(1pt.)** cells with similar nuclear and cytoplasmic characteristics and an average of 4-8 nuclei per cell. There is extensive ulceration **(1pt.)** of the overlying gingival epithelium and subjacent to this area, there is extensive infiltration of the mass by numerous viable and degenerate neutrophils **(1pt.)** admixed with cellular debris, edema **(1pt.)**, hemorrhage, small amounts of polymerized fibrin. Small areas of necrosis **(1pt.)** are scattered throughout the edge of the mass. More recognizable granulation tissue **(1pt.)** predominates at the edge of the ulcer (which coincides with the periphery of the mass.) The periphery of the section contains fragments of woven bone **(1pt.)** which are lined by active osteoblasts and occasional osteoclasts and separated by moderate amounts of mature collagen, hemorrhage, edema and low numbers of macrophages and lymphocytes.

**MORPHOLOGIC DIAGNOSIS:** Gingiva: Peripheral giant cell granuloma **(5pt.)**

O/C: **(1pt.)**