A night-time photograph of the Tower Bridge in London, illuminated with warm lights. The bridge's two towers and suspension cables are visible against a dark blue sky. The bridge is reflected in the water below.

**ESVCP – ECVCP Congress
London 2017**

MISTERY SLIDES SESSION

- Cytology -

**Carlo Masserdotti DVM, DipIECVCP, Spec Bioch Clin IAT
Brescia**



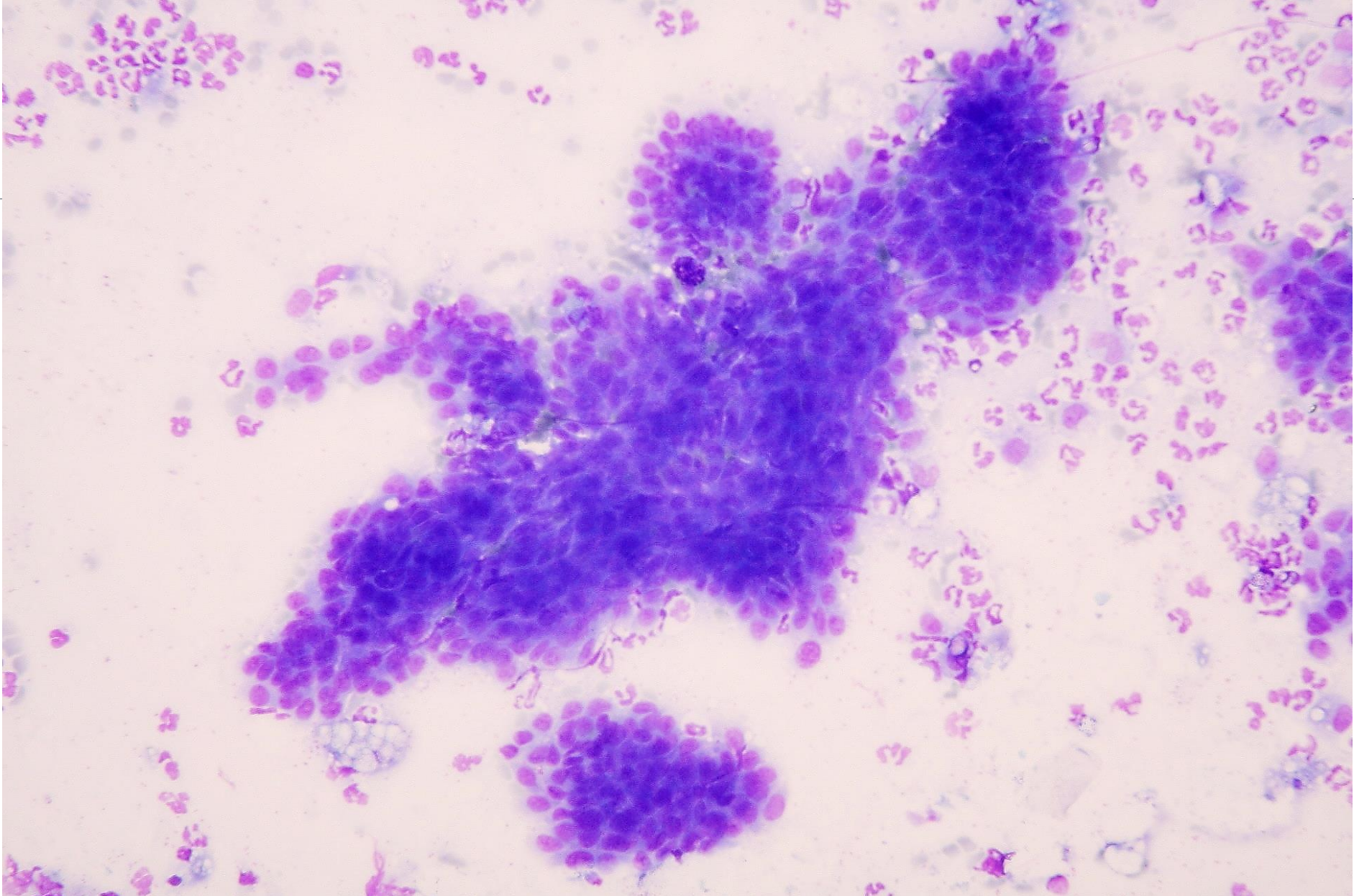
IDEXX International Education

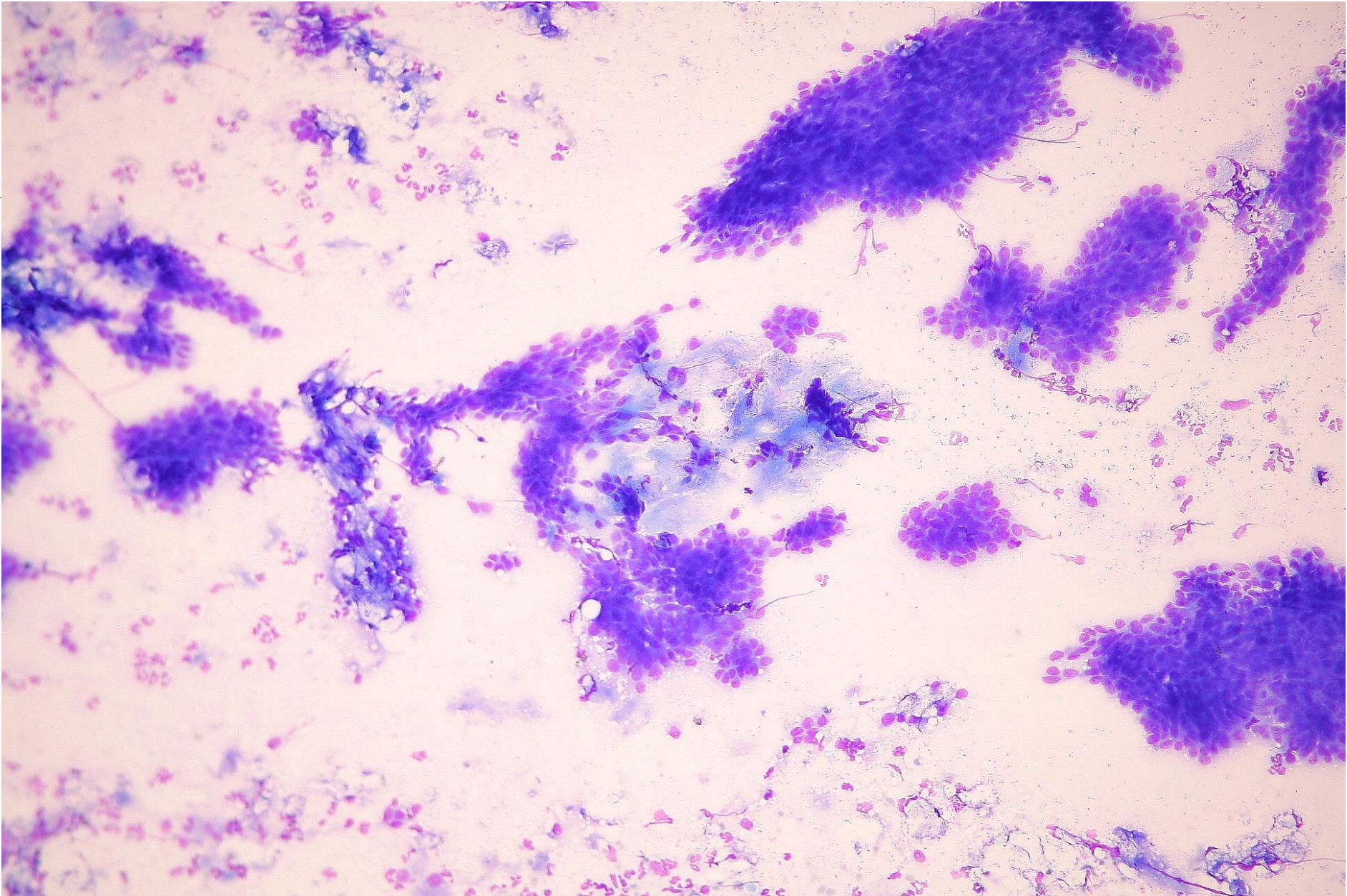
IDEXX
LABORATORIES

Case #1

- Dog, Golden retriever, 13-years-old, male
- Cutaneous nodule at the base of ear pinna
 - Ulcerated surface
 - FNCS
 - MGG stain

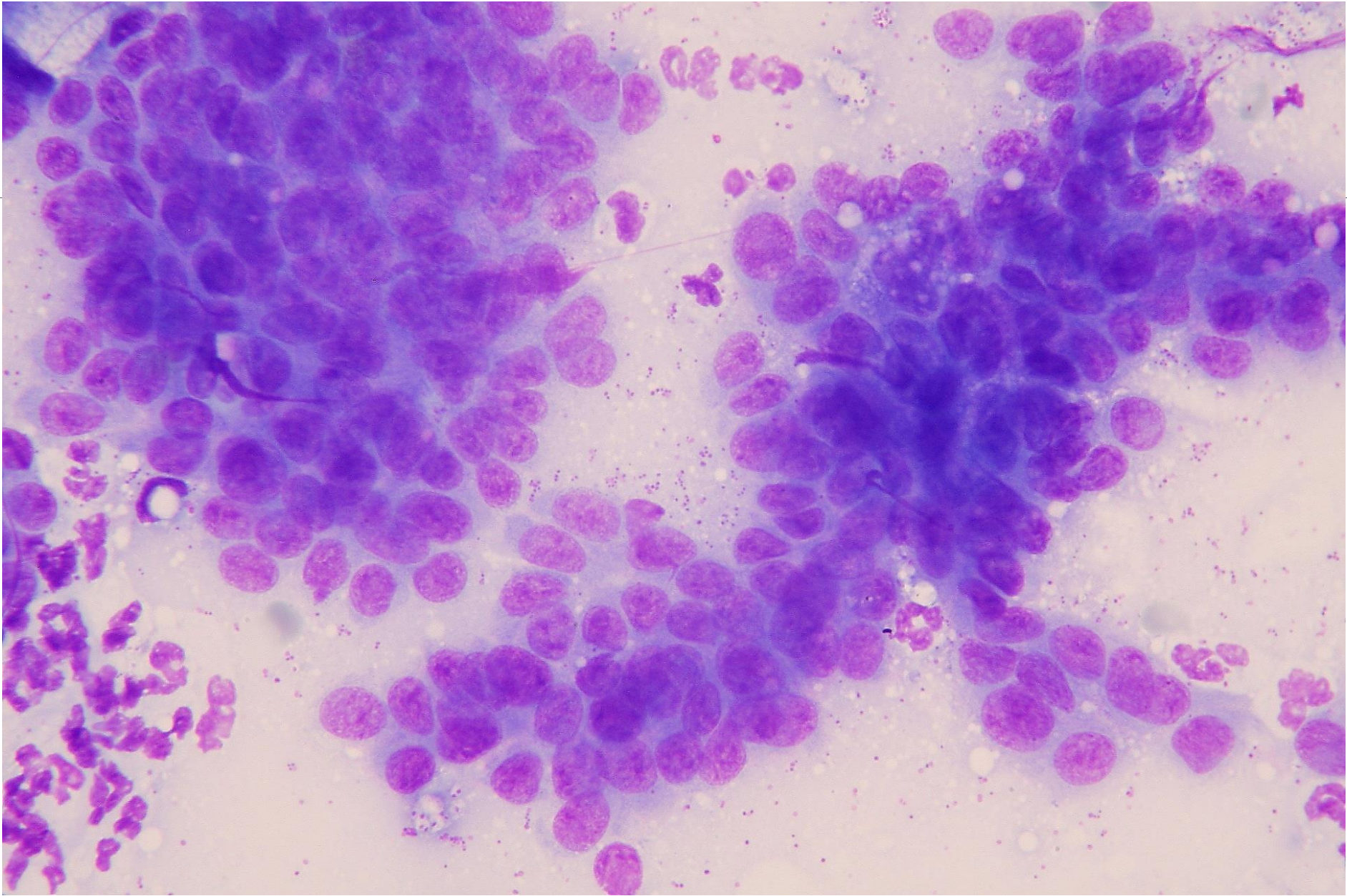






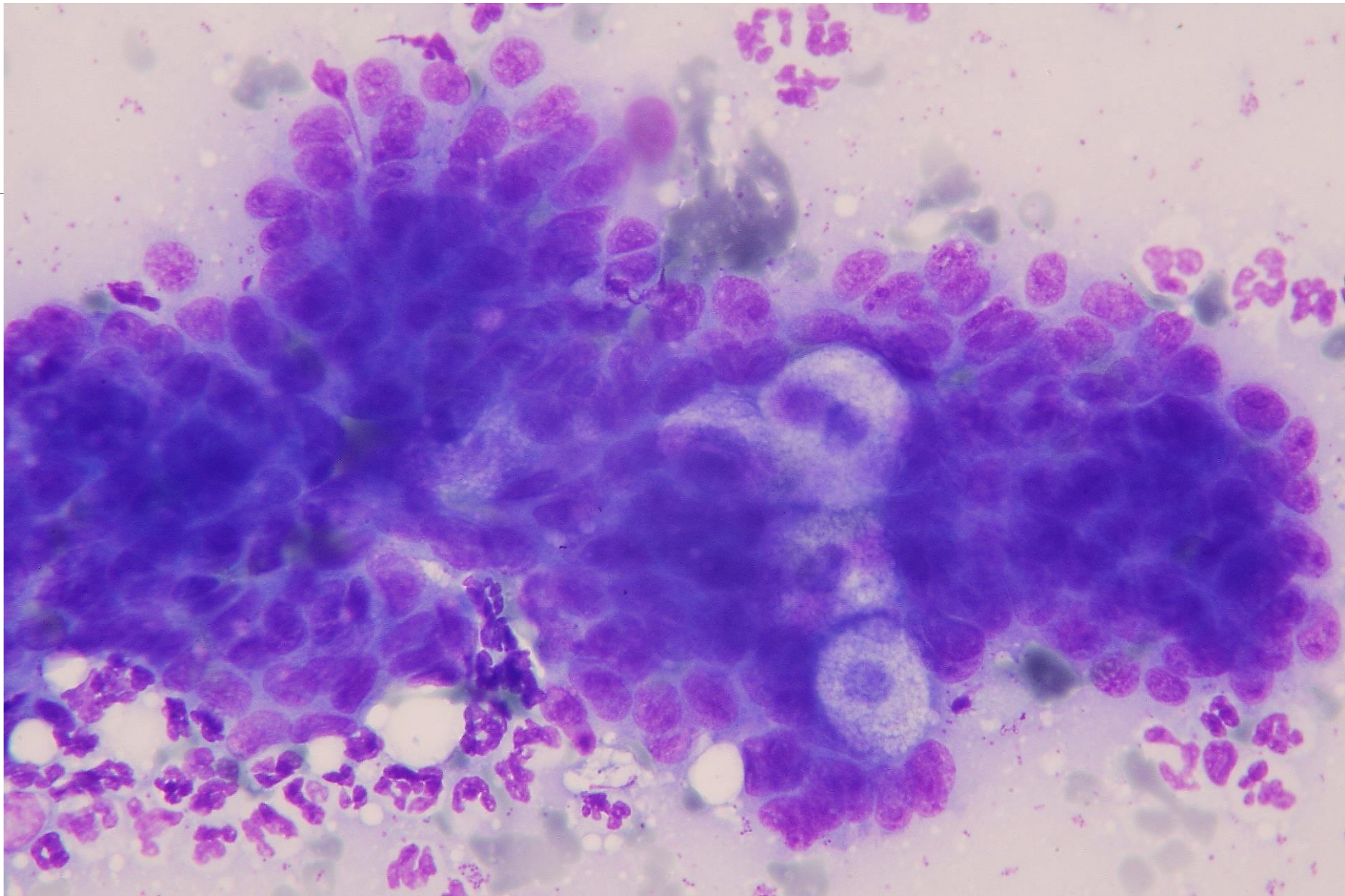
IDEXX International Education

IDEXX
LABORATORIES



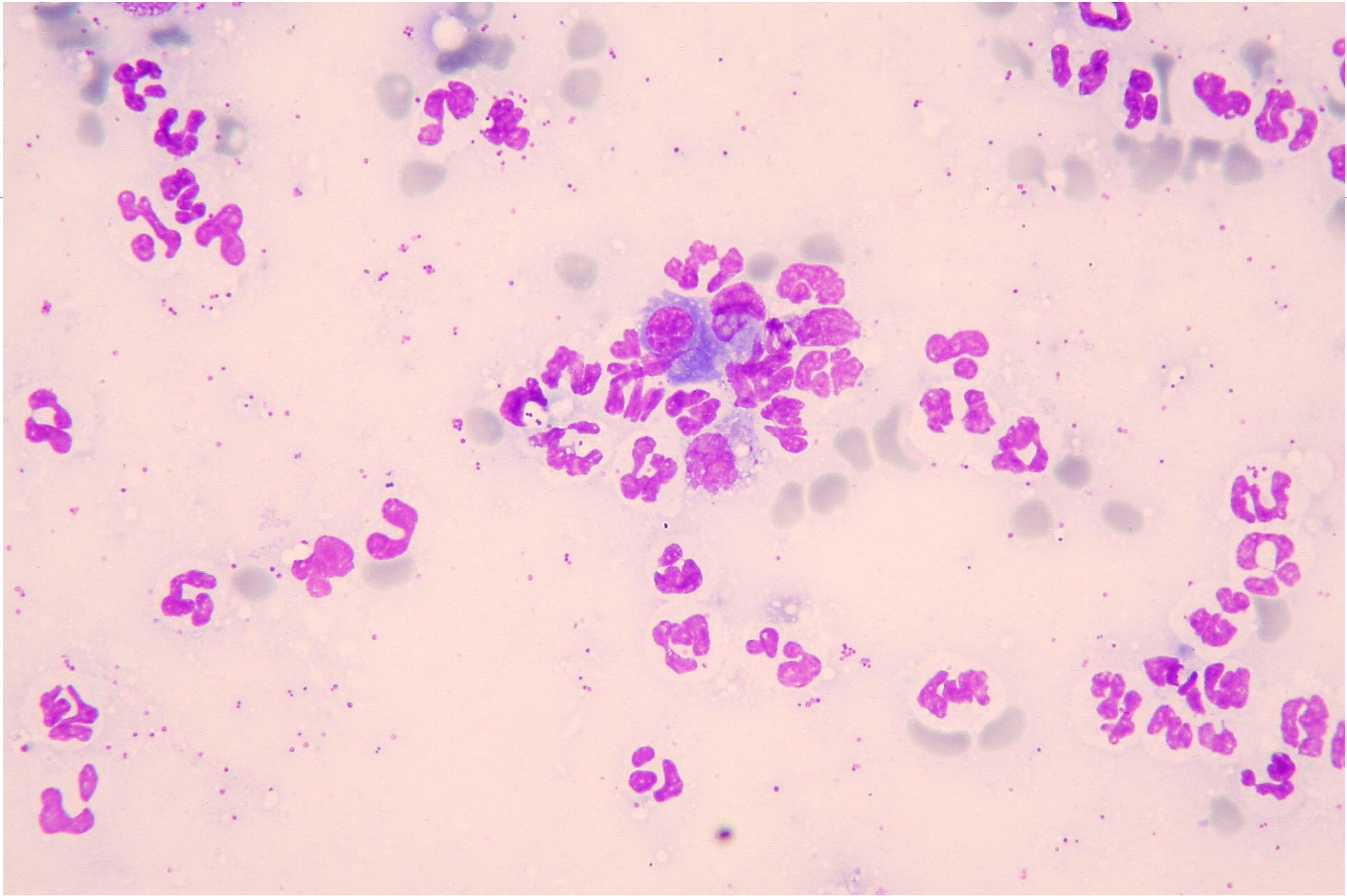
IDEXX International Education

IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES

Cytologic findings

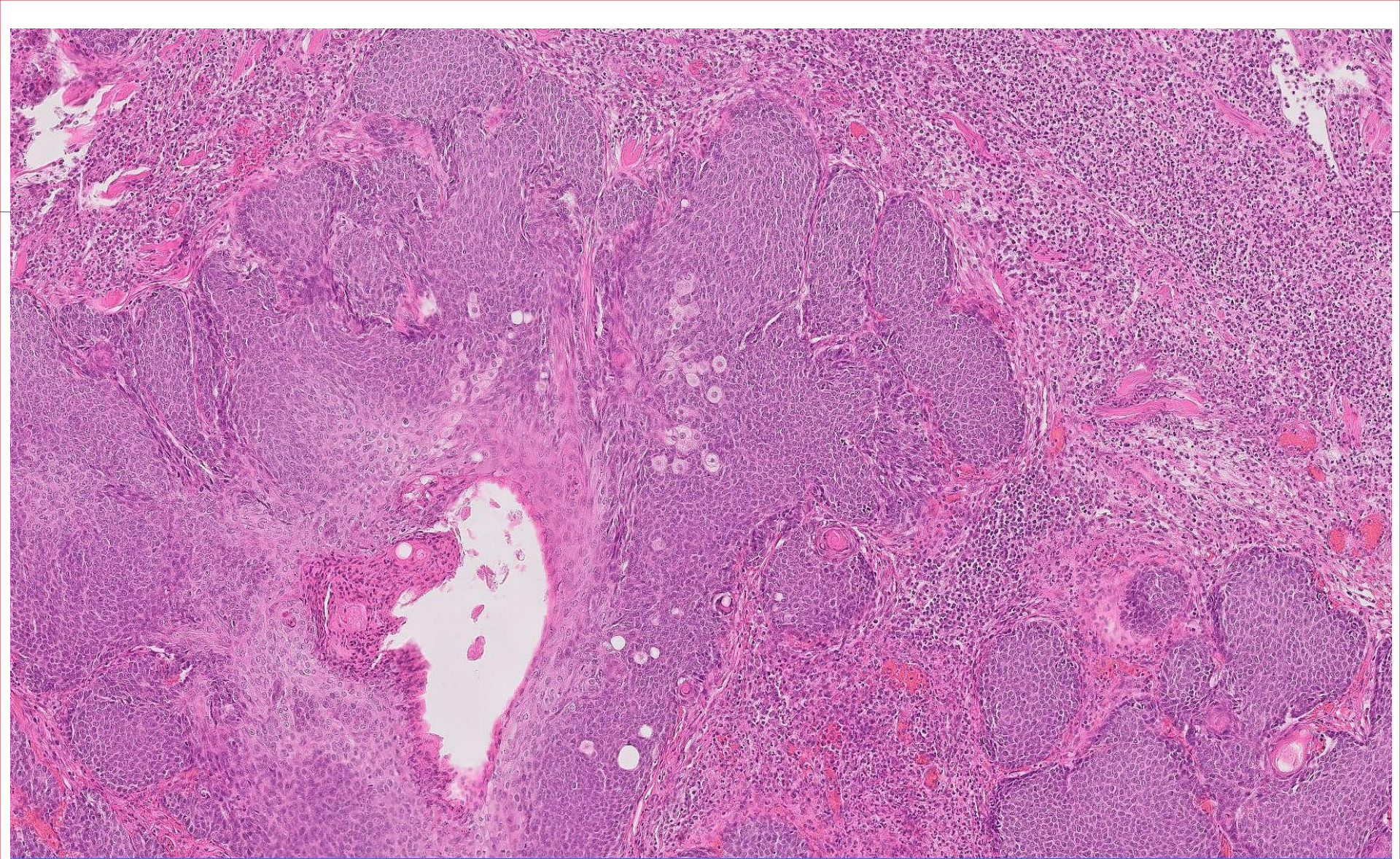
- Epithelial cells
 - Moderate malignancy criteria
 - Dischoesiveness
- Moderate anisocytosis and anisokaryosis
- Sebaceous differentiation
- Suppurative septic inflammation



Diagnosis

- Cytologic diagnosis: sebaceous epithelioma with secondary septic suppurative inflammation
- DD:
 - Sebaceous carcinoma





Histologic diagnosis: sebaceous carcinoma with secondary inflammation



IDEXX International Education

IDEXX
LABORATORIES

Bettini G, Morini M, Mandrioli L, Capitani O, Gandini G.
CNS and lung metastasis of sebaceous epithelioma in a dog.
Vet Dermatol. 2009 Aug;20(4):289-94

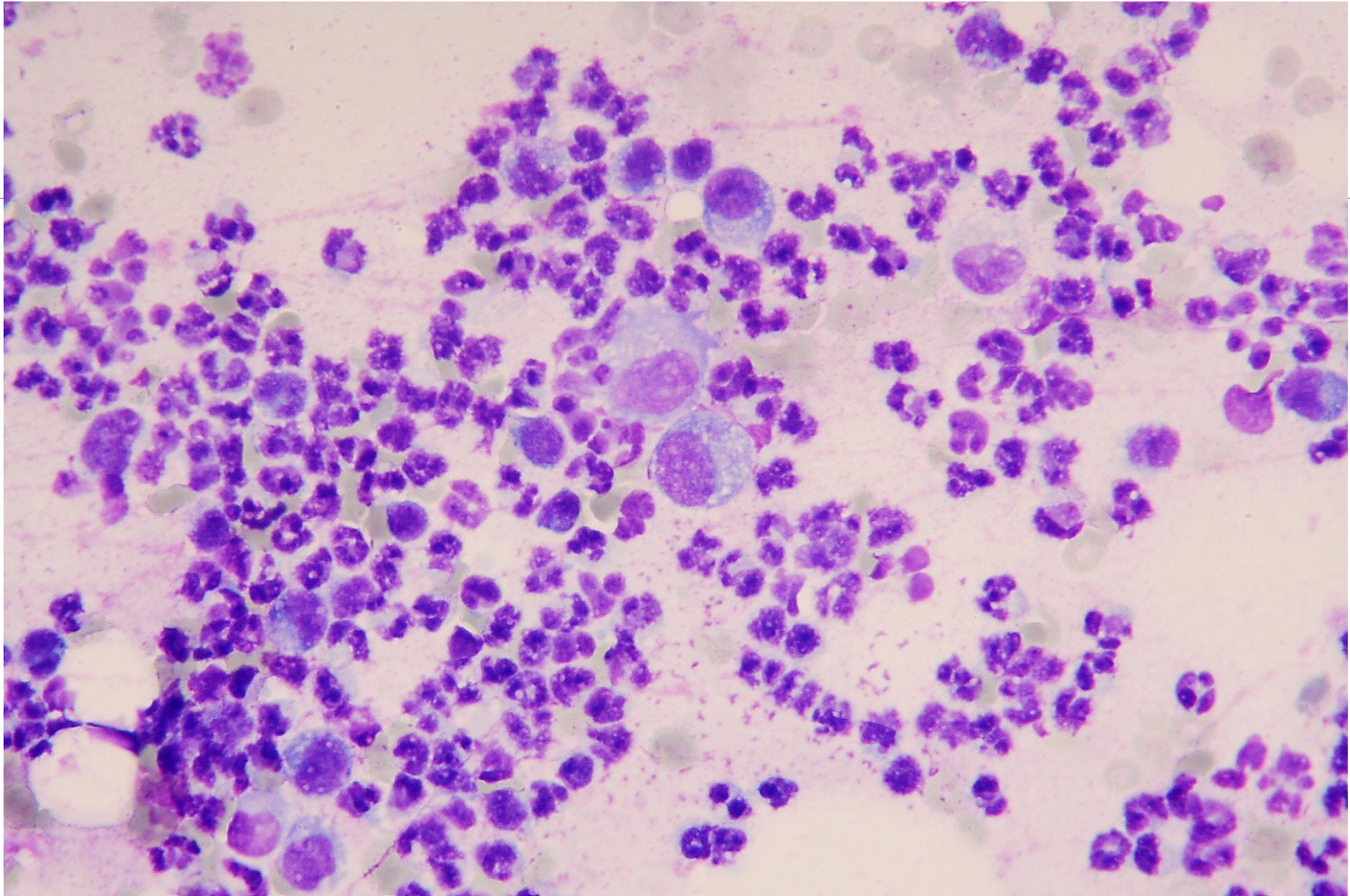
- Sebaceous epithelioma is a common canine cutaneous neoplasm characterized by a preponderance of basaloid cells with few well-differentiated sebocytes.
- It is considered a low-grade malignancy, as it may occasionally recur at the excision site.
- The possibility of lymph node metastasis is anecdotally reported, and distant metastases have never been observed. This case report presents local recurrence 11 months after the excision of the primary sebaceous epithelioma and multiple lung and central nervous system metastases 5 months later
- The designation epitheliomatous sebaceous carcinoma has been suggested for aggressive sebaceous epitheliomas, **although differential criteria are still to be determined.**



Case #2

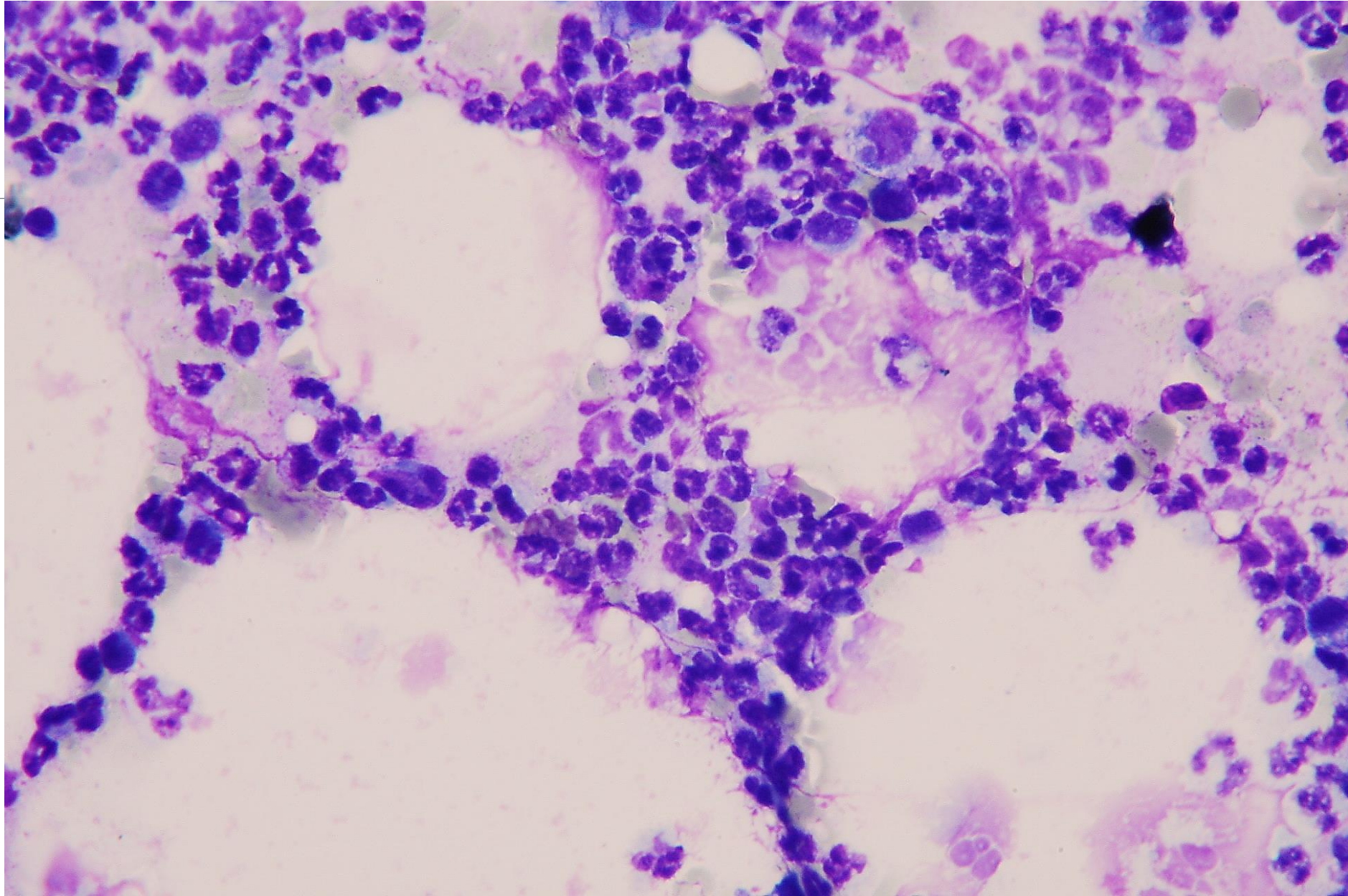
- Dog, Labrador retriever, 3-months-old, male
- Multiple nodules on the body
 - Chest
 - Palpebral rim
 - Facial
- Ulcerative lesion on the lips
- Retromandibular lymphadenomegaly
 - FNCS of the mass
 - MGG stain





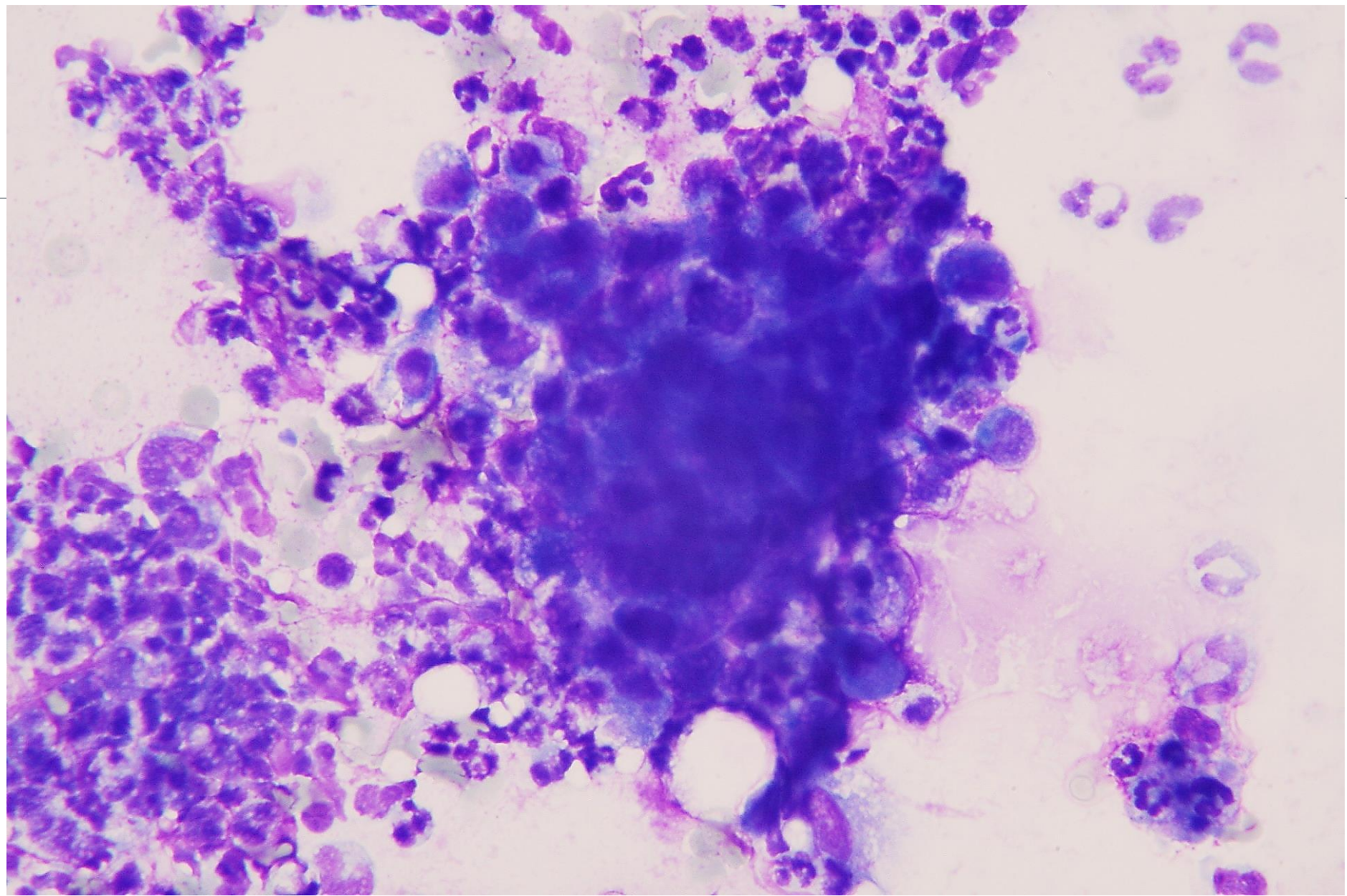
IDEXX International Education

IDEXX
LABORATORIES



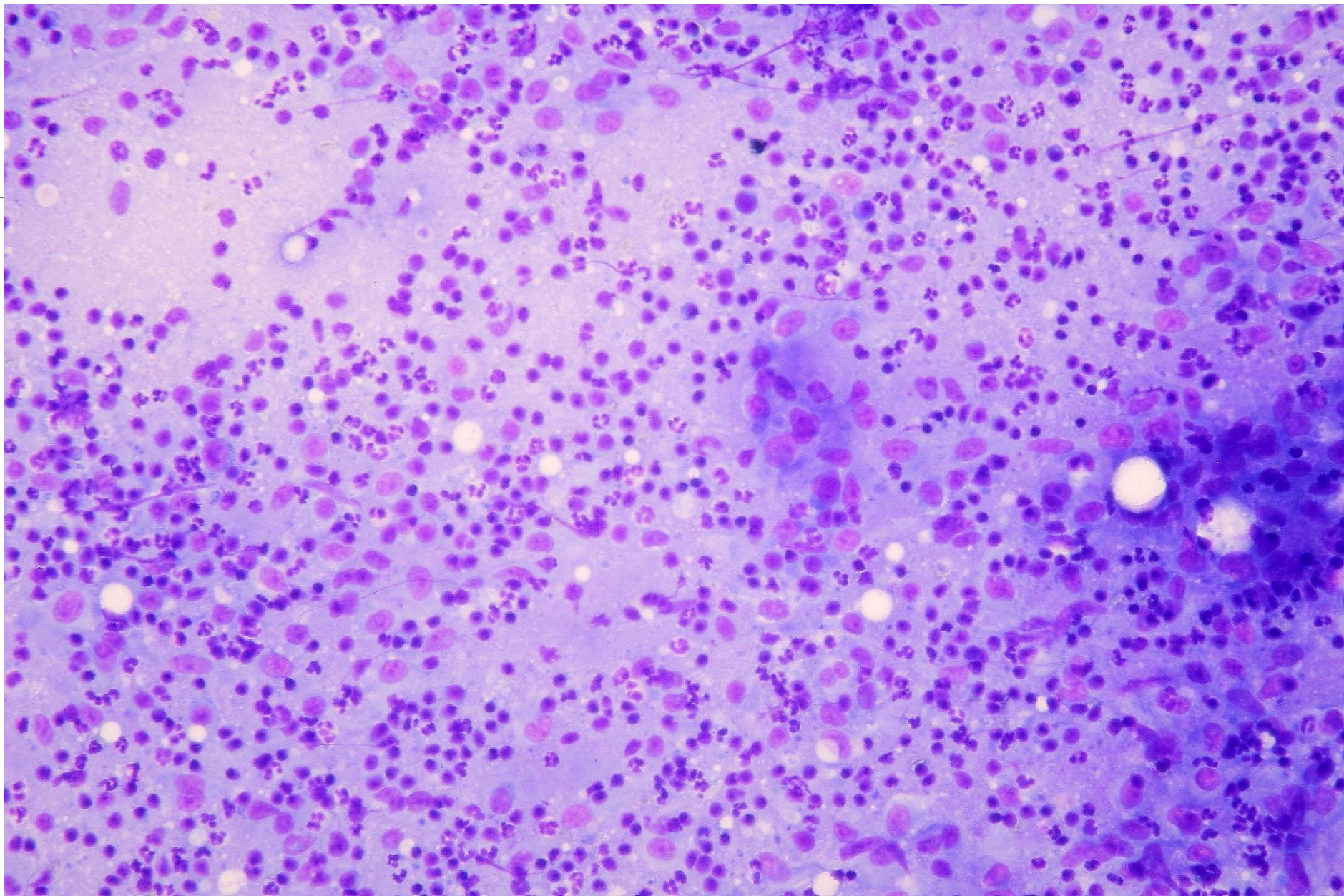
IDEXX International Education

IDEXX
LABORATORIES



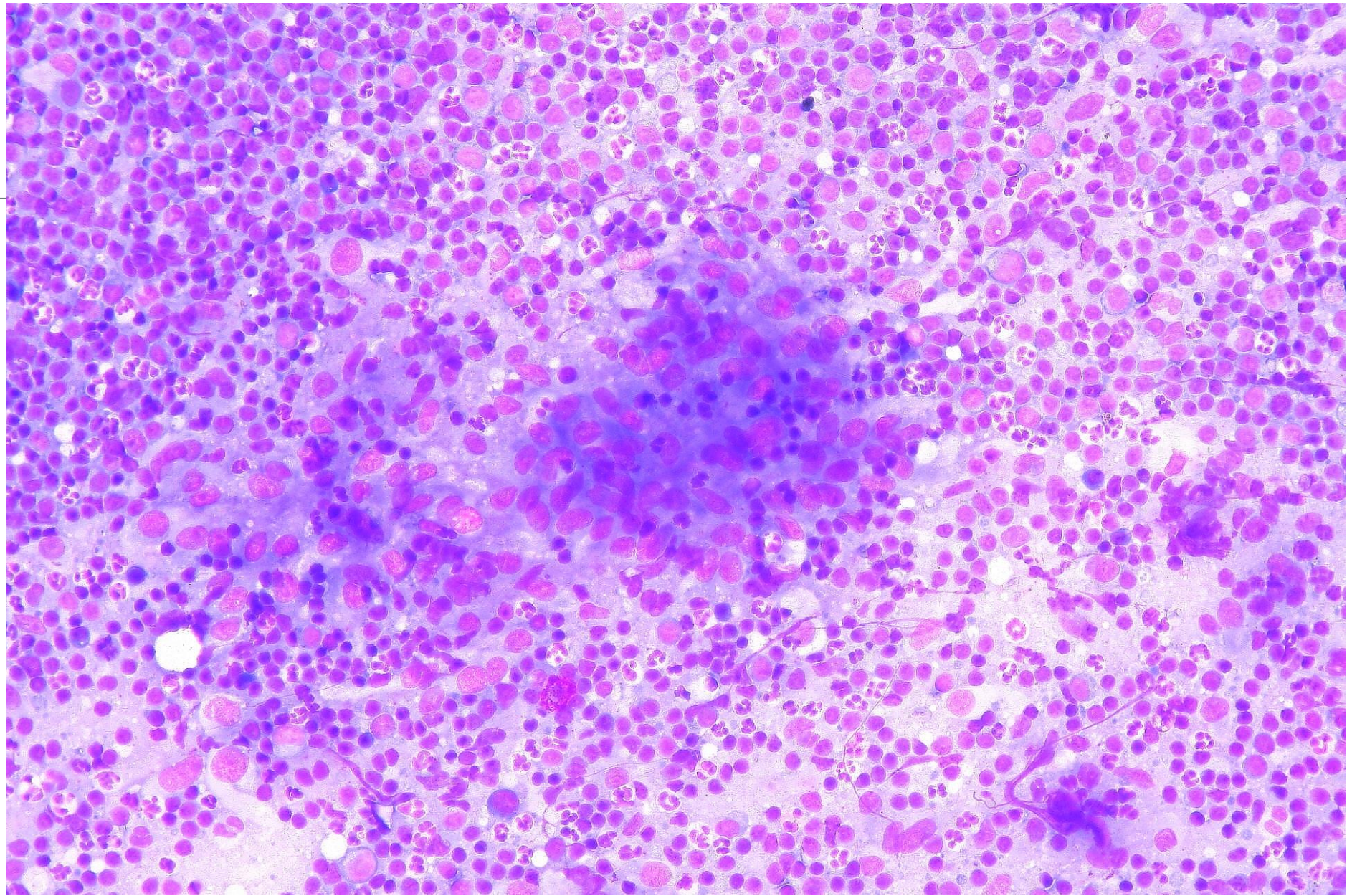
IDEXX International Education

IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES

Cytologic findings

- Skin lesion
 - Inflammatory cells
 - Degenerate and well-preserved neutrophils
 - Scattered macrophages
 - Rare epithelioid aggregates
 - No evidence of microorganisms
- Lymphnode
 - Polymorphic, lymphoid cells
 - Many neutrophils
 - Large aggregates of epithelioid macrophages



Diagnosis

- Cytologic diagnosis:
 - Suppurative, non-septic inflammation
 - Pyogranulomatous lymphadenitis
- Clinical diagnosis:
 - Juvenile cellulitis
 - Puppy strangles
 - Juvenile sterile granulomatous dermatitis and lymphadenitis
 - Juvenile pyoderma



Juvenile cellulitis

- Classical clinical signs:
 - Swelling on the face
 - Papules
 - Nodules
 - Pustules and vesicles
 - Submandibular lymphadenomegaly
- Unusual presentation in this case:
 - Nodules on the chest



Juvenile cellulitis

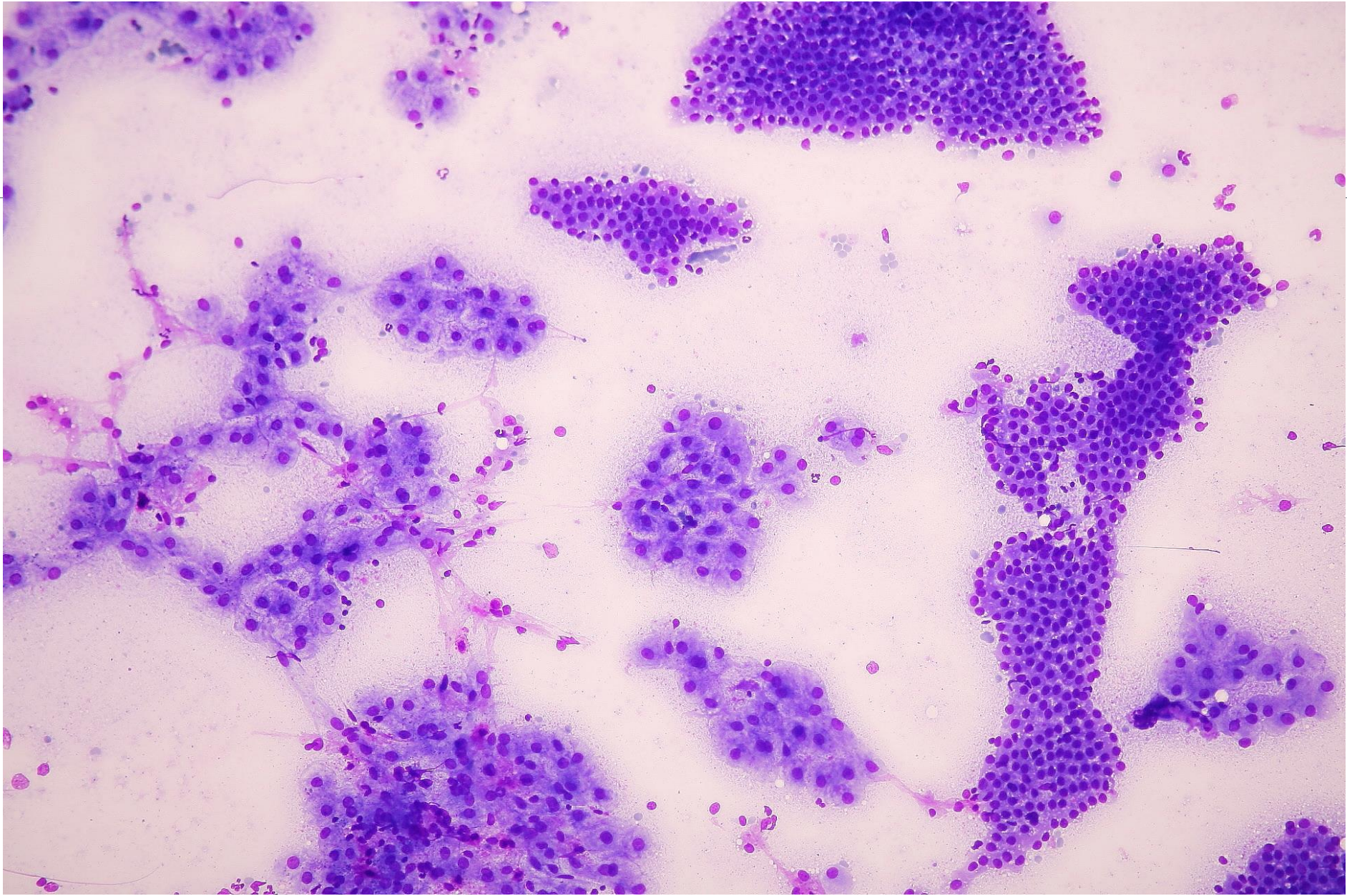
- Pathogenesis of this condition not fully understood
- Due to its responsiveness to corticosteroids, it is thought to involve some degree of immune dysfunction, likely in combination with hereditary components
 - Breed predilections for Golden retriever, Labrador retriever, Dachshund, Setter gordon, Lhasa Apso
- It is suggested that juvenile cellulitis is a systemic condition with primary lymphadenopathy resulting in secondary dermatological lesions



Case #3

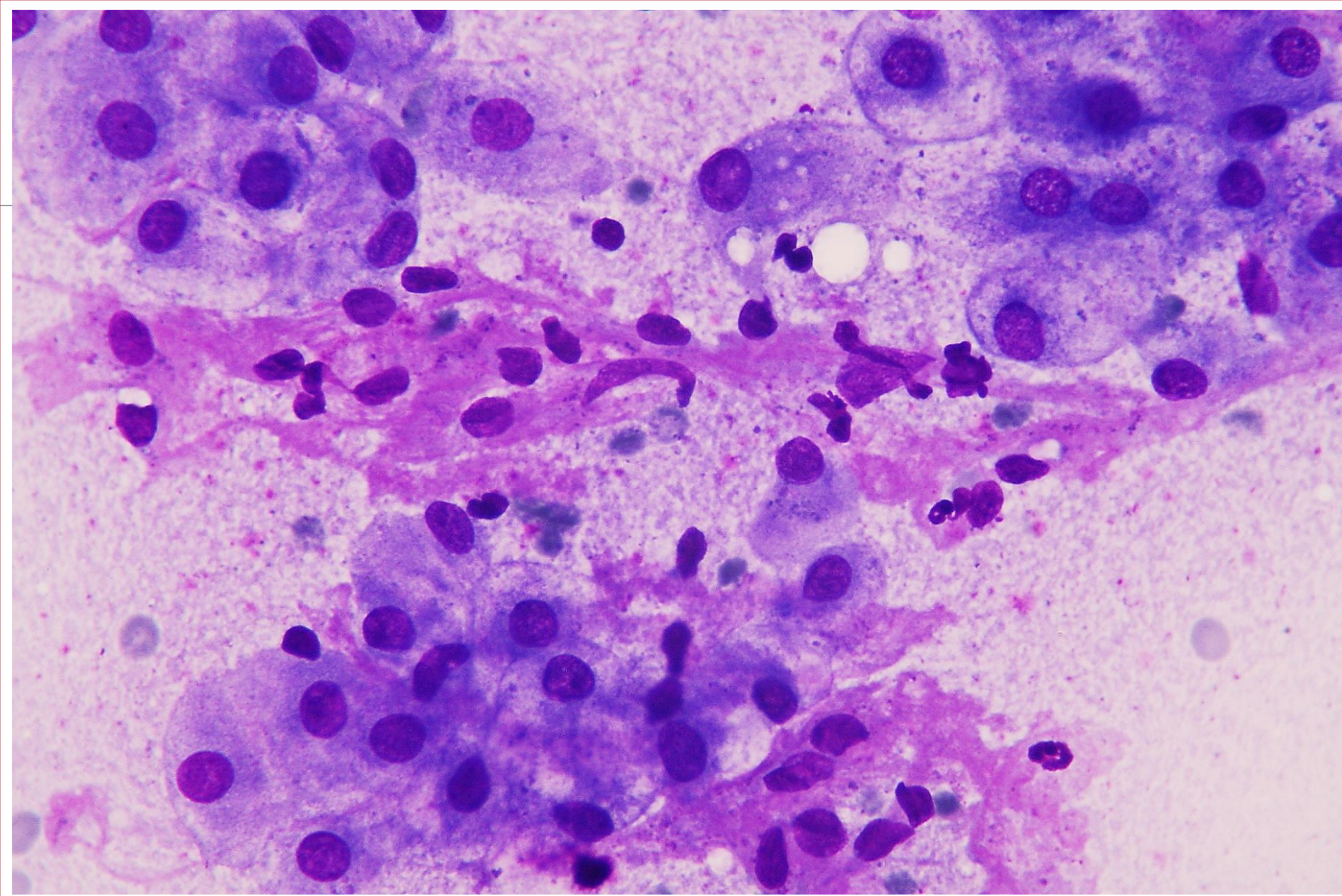
- Dog, mongrel, female neutered, 12-years-old
- Hepatomegaly, hyperechogenic disomogeneous parenchyma
- Increase of ALT and ALP
 - Ultrasonography-guided FNCS
 - MGG stain





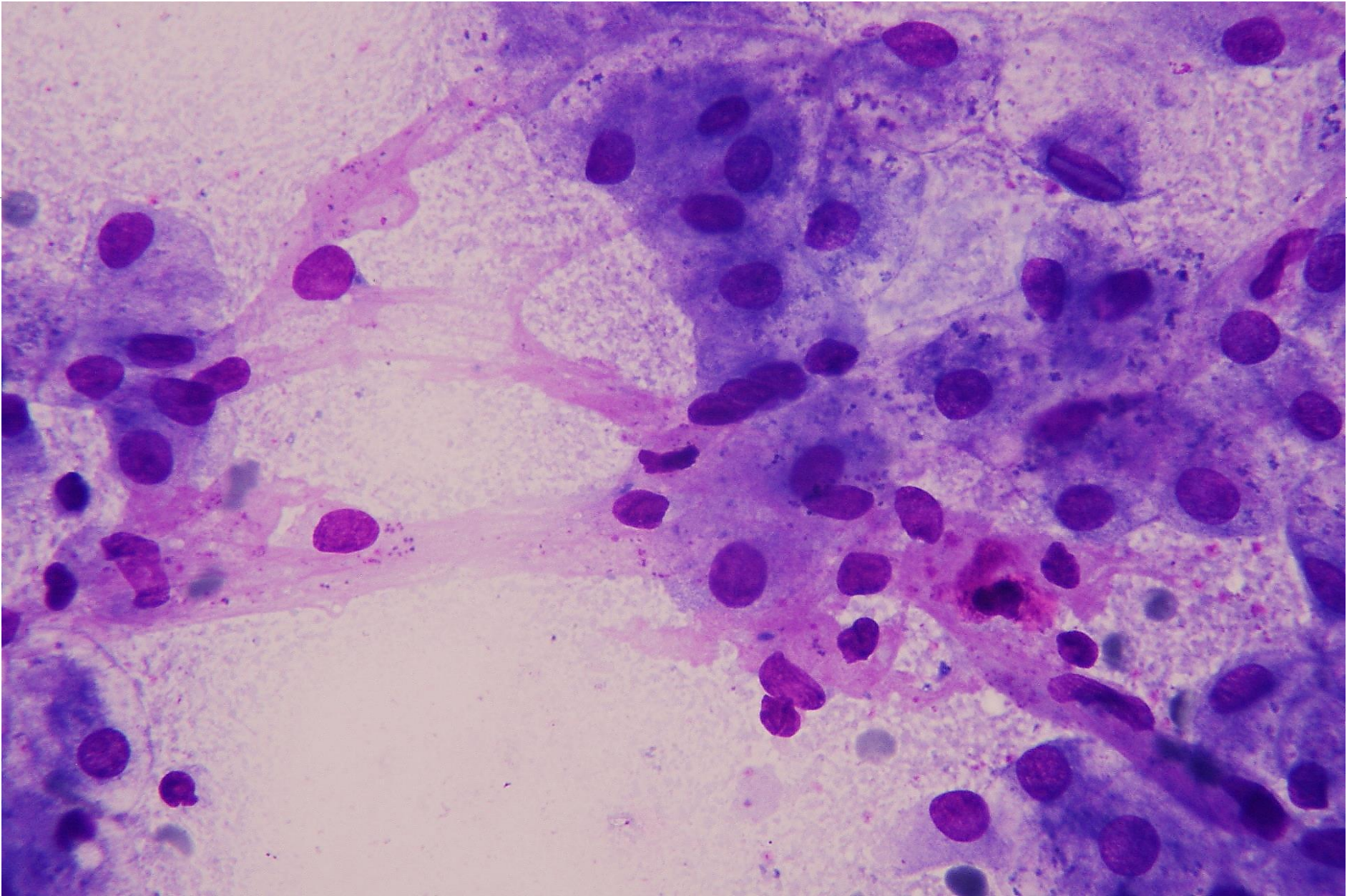
IDEXX International Education

IDEXX
LABORATORIES



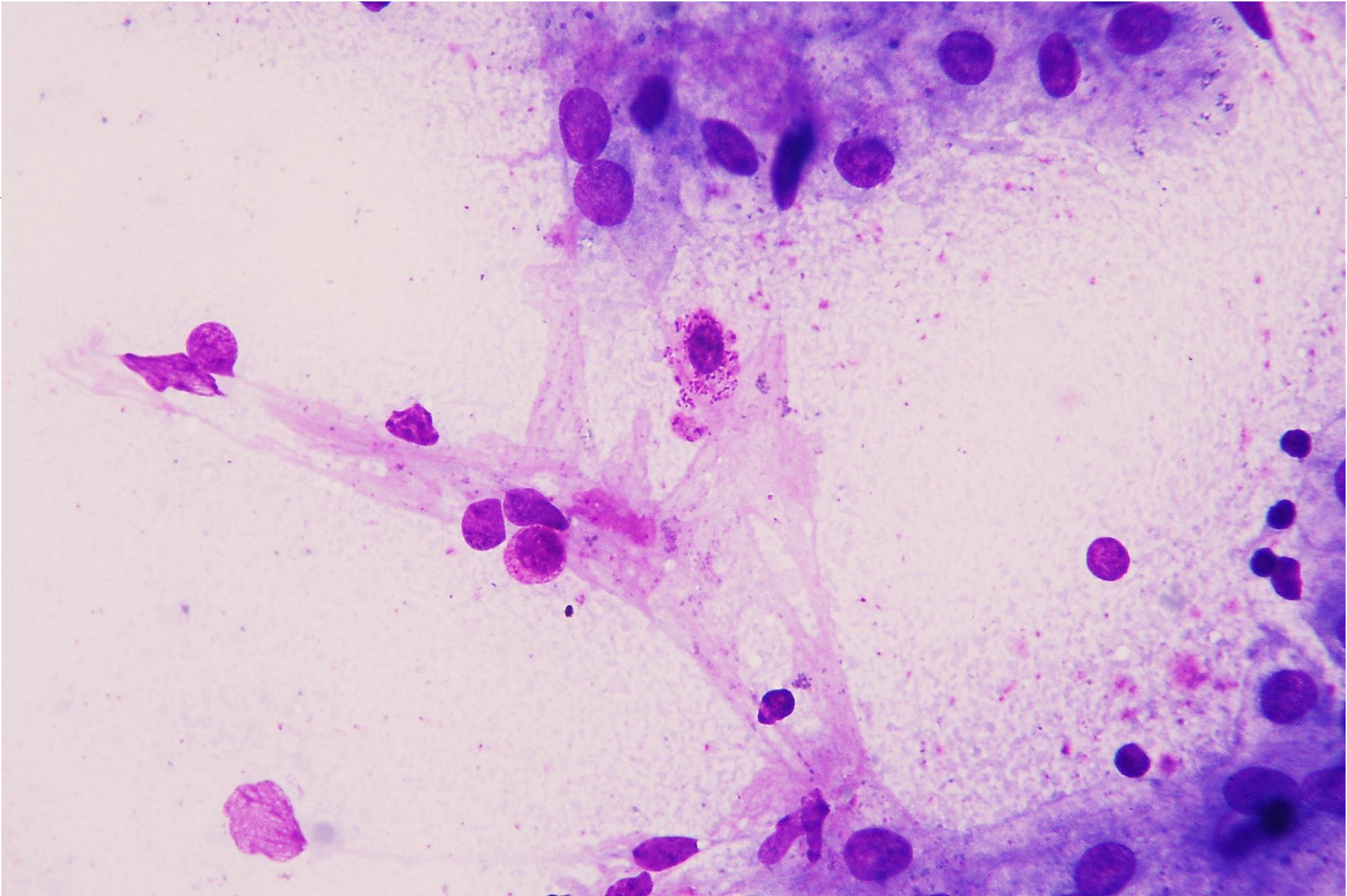
IDEXX International Education

IDEXX
LABORATORIES



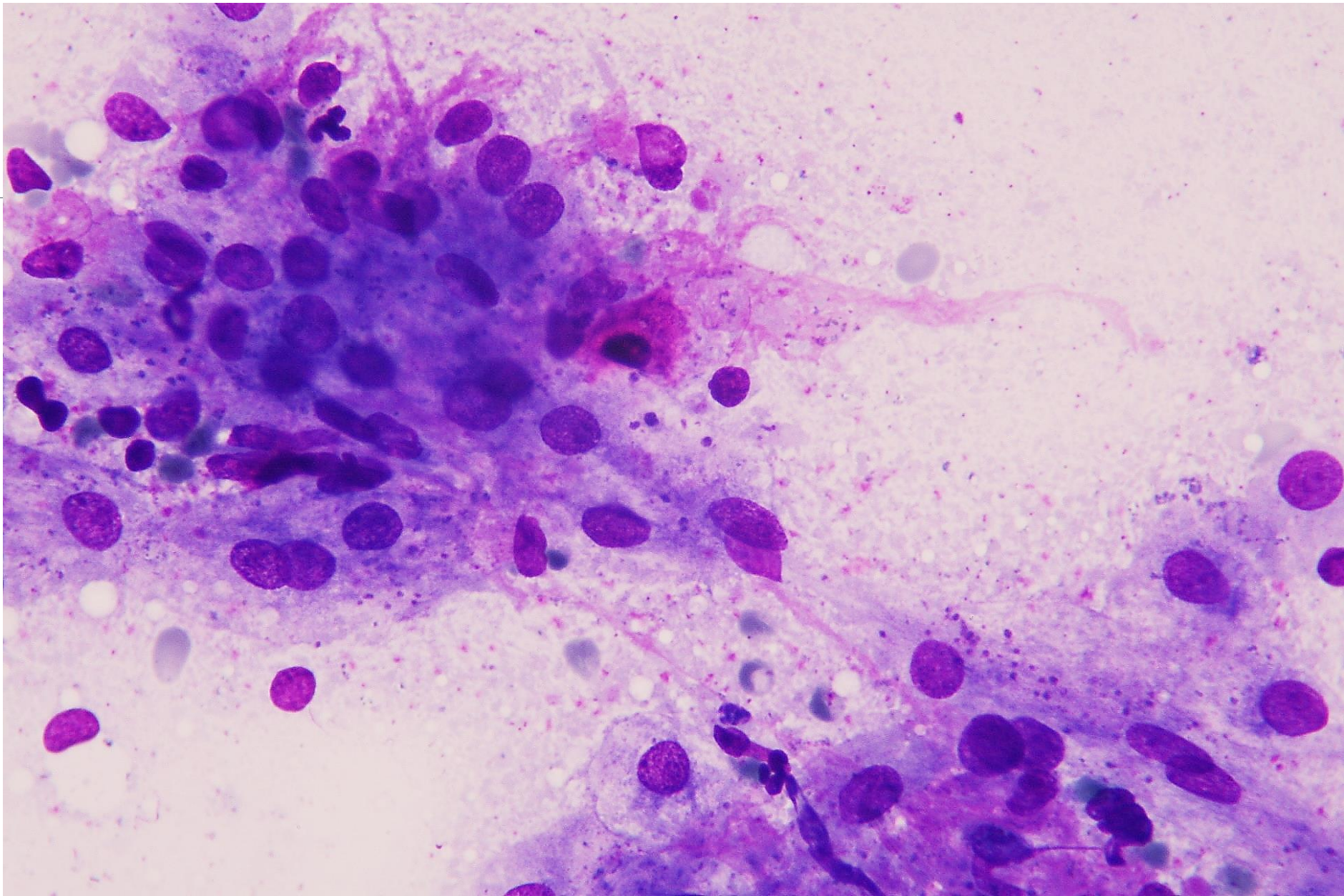
IDEXX International Education

IDEXX
LABORATORIES



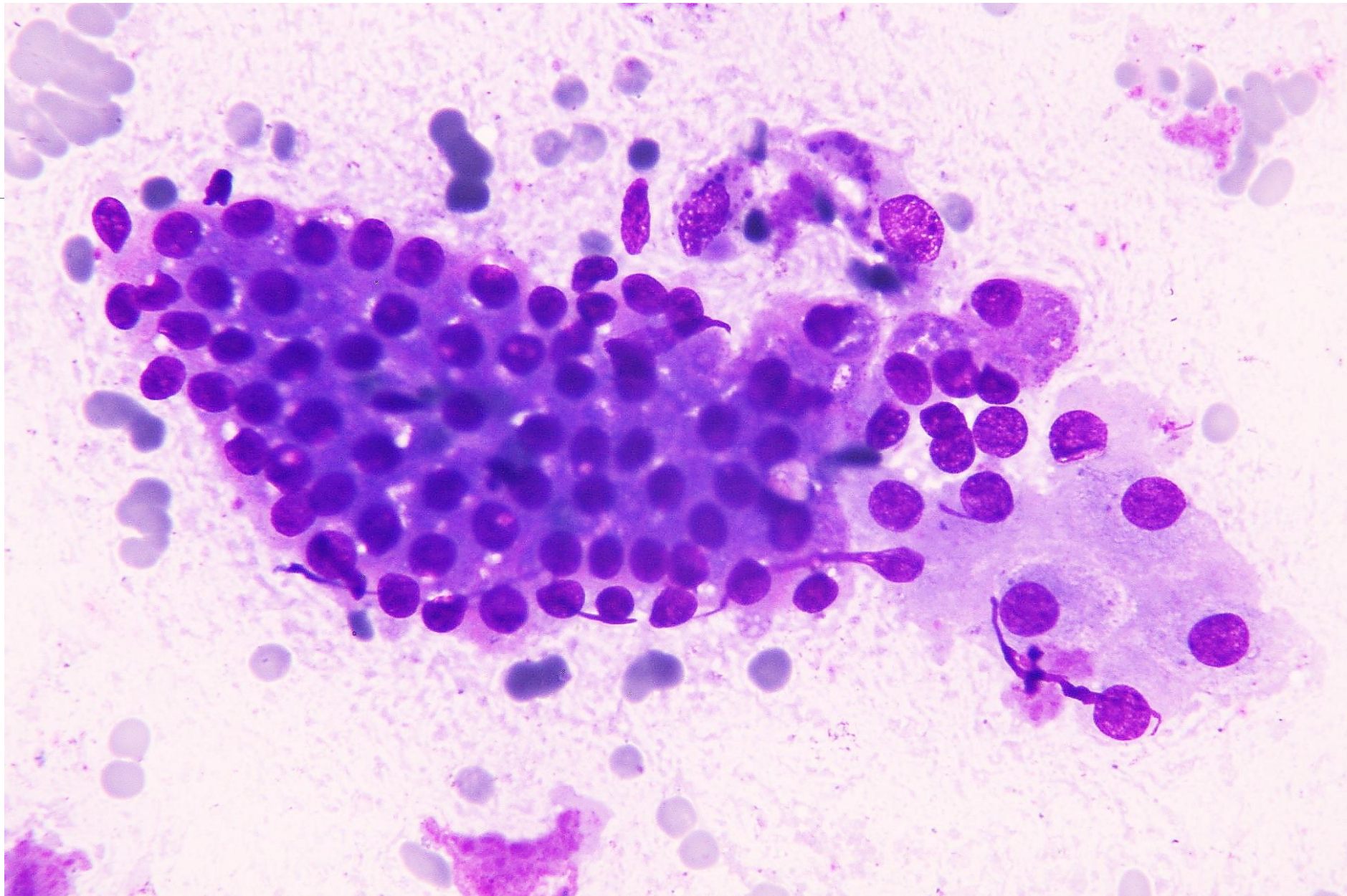
IDEXX International Education

IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES

Cytologic findings

- Moderate swelling of hepatocytes
 - Aspecific, reversible degeneration
 - Glycogen or water accumulation
- Many spindle cells among hepatocytes
 - Bridges and thin “septa”
 - Small granules in the cytoplasm
- Presence of mast cells scattered among the spindle cells
- Large sheets of reactive cholangiocytes



Cytologic diagnosis

- Hepatic fibrosis; proliferative (reactive?) cholangiopathy
- This diagnosis should address further examination of hepatic parenchyma with histologic evaluation



Cytologic features of hepatic fibrosis in dogs: a retrospective study on 22 cases.

Vet Clin Pathol. 2016 Jun;45(2):361-7

Table 3. Statistical comparison of the ratio spindle cells/hepatocytes, granulocytes/hepatocyte, lymphoplasmacytic cells/hepatocytes, macrophages/hepatocytes, and mast cells/hepatocytes between dogs with (Group B) and without (Group A) liver fibrosis (significant differences $P < .01$, bold).

	Spindle cells/ Hepatocytes		Granulocytes/ Hepatocytes		Lymphoplasmacytic/ Hepatocytes		Macrophages/ Hepatocytes		Mast cells/ Hepatocytes	
	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
Mean	0.336	0.012	0.099	0.123	0.043	0.055	0.05	0.053	0.014	0.002
SD	0.3	0.026	0.074	0.093	0.035	0.044	0.04	0.085	0.011	0.003
Interquartile range	0.141	0.009	0.087	0.091	0.055	0.05	0.05	0.068	0.017	0.003
Median	0.24	0	0.077	0.093	0.047	0.044	0.04	0.055	0.01	0
Mann-Whitney U-test	$P < .01$		$P = .76$		$P = .75$		$P = .52$		$P < .01$	

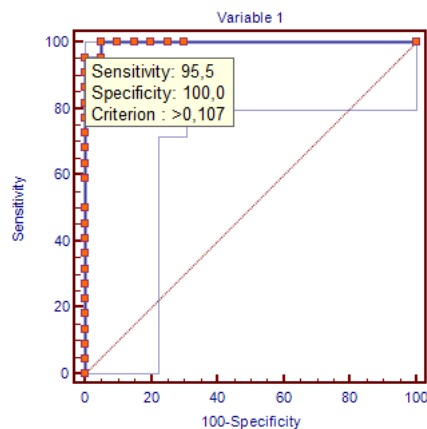
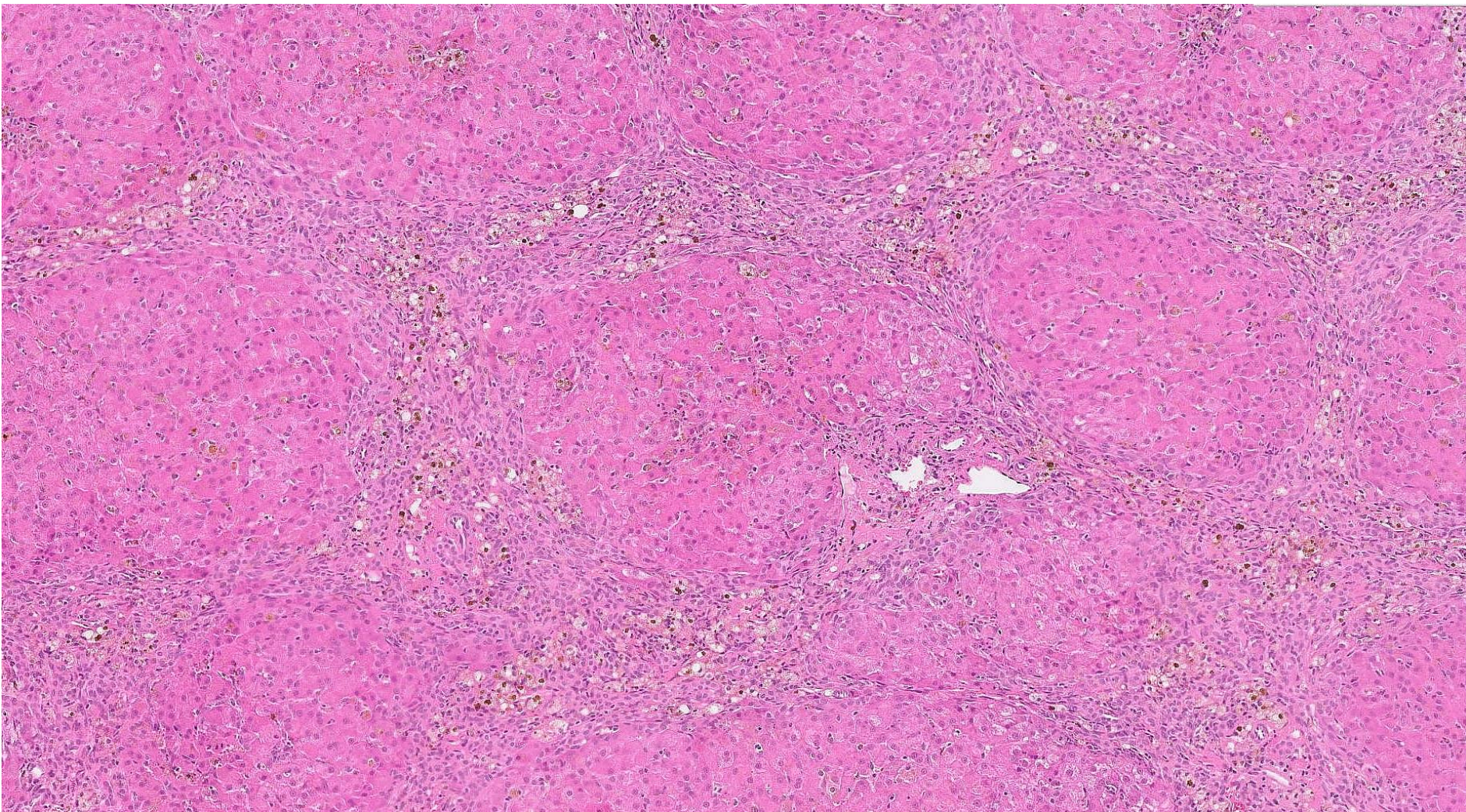
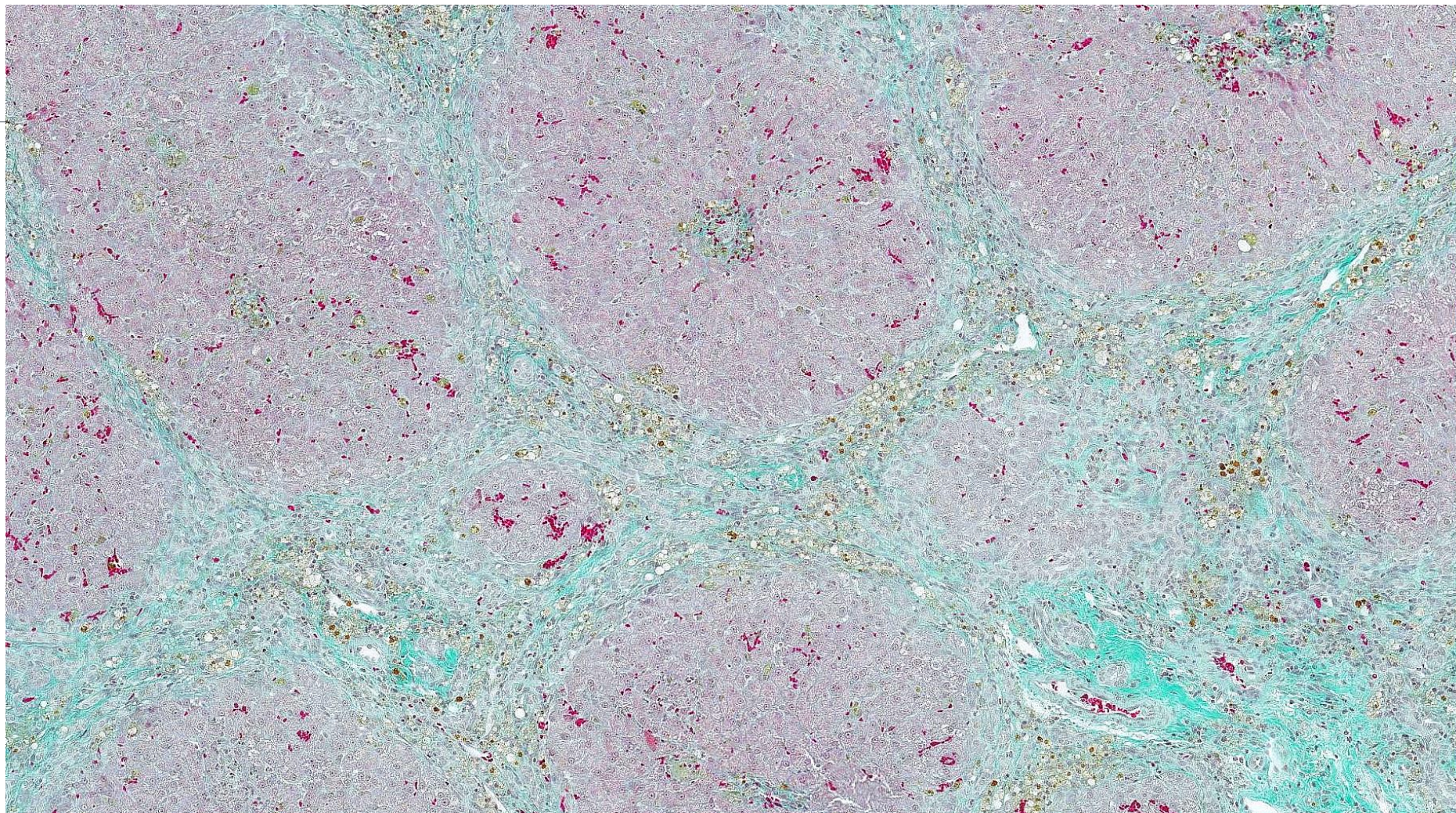


Figure 2. Receiver operating characteristic (ROC) curve for the ratios of (A) spindle cells to hepatocytes (at cutoff 0.107, with a sensitivity of 0.955, a specificity of 100%, and area under the curve [AUC] 0.998); and (B) mast cells to hepatocytes (at cutoff 0.04, with a sensitivity of 86.4%, a specificity of 90%, and AUC 0.936) for the cytologic discrimination between canine liver with and without fibrosis.



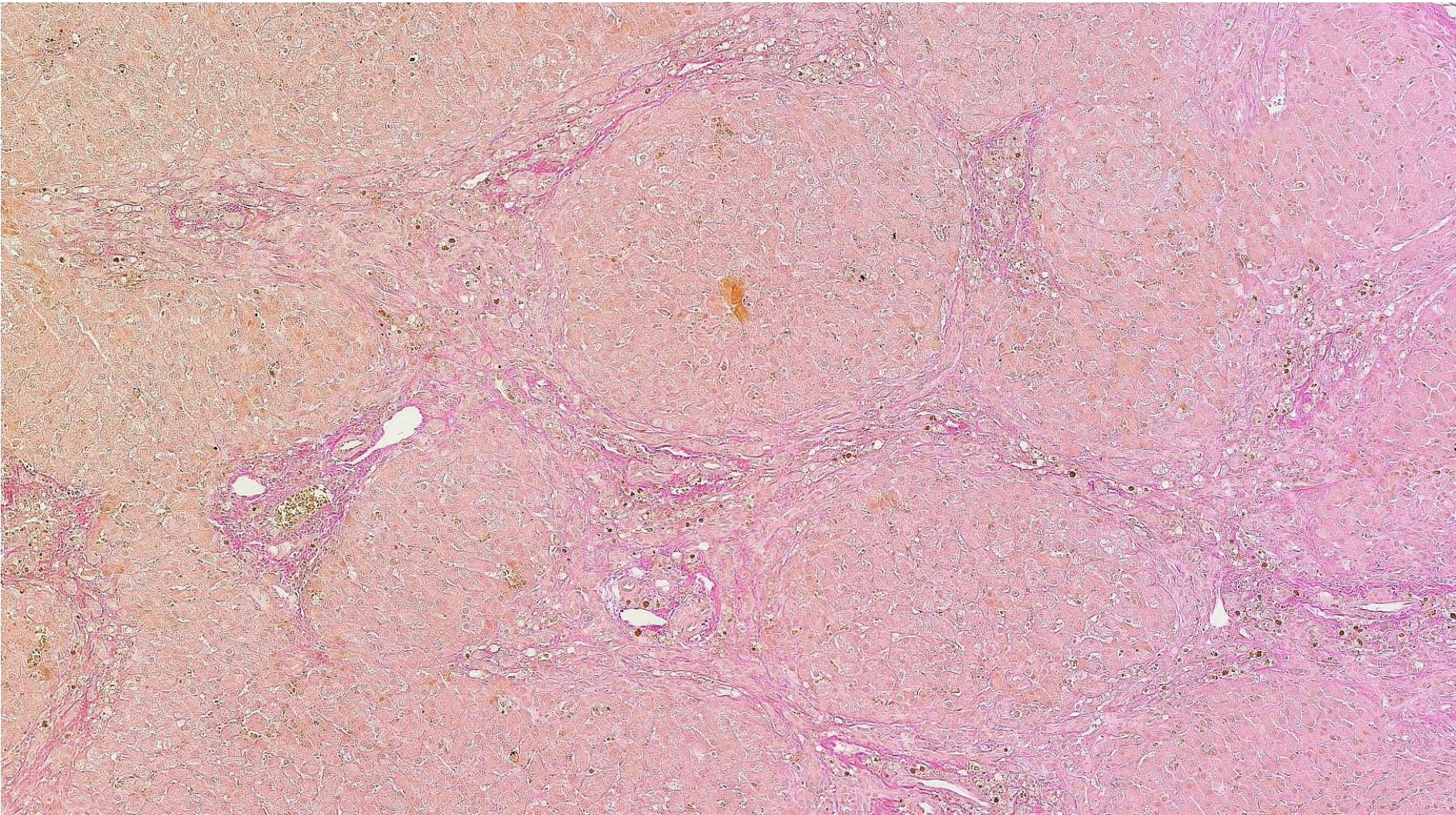
Histologic diagnosis: end-stage fibrosis (cirrhosis)





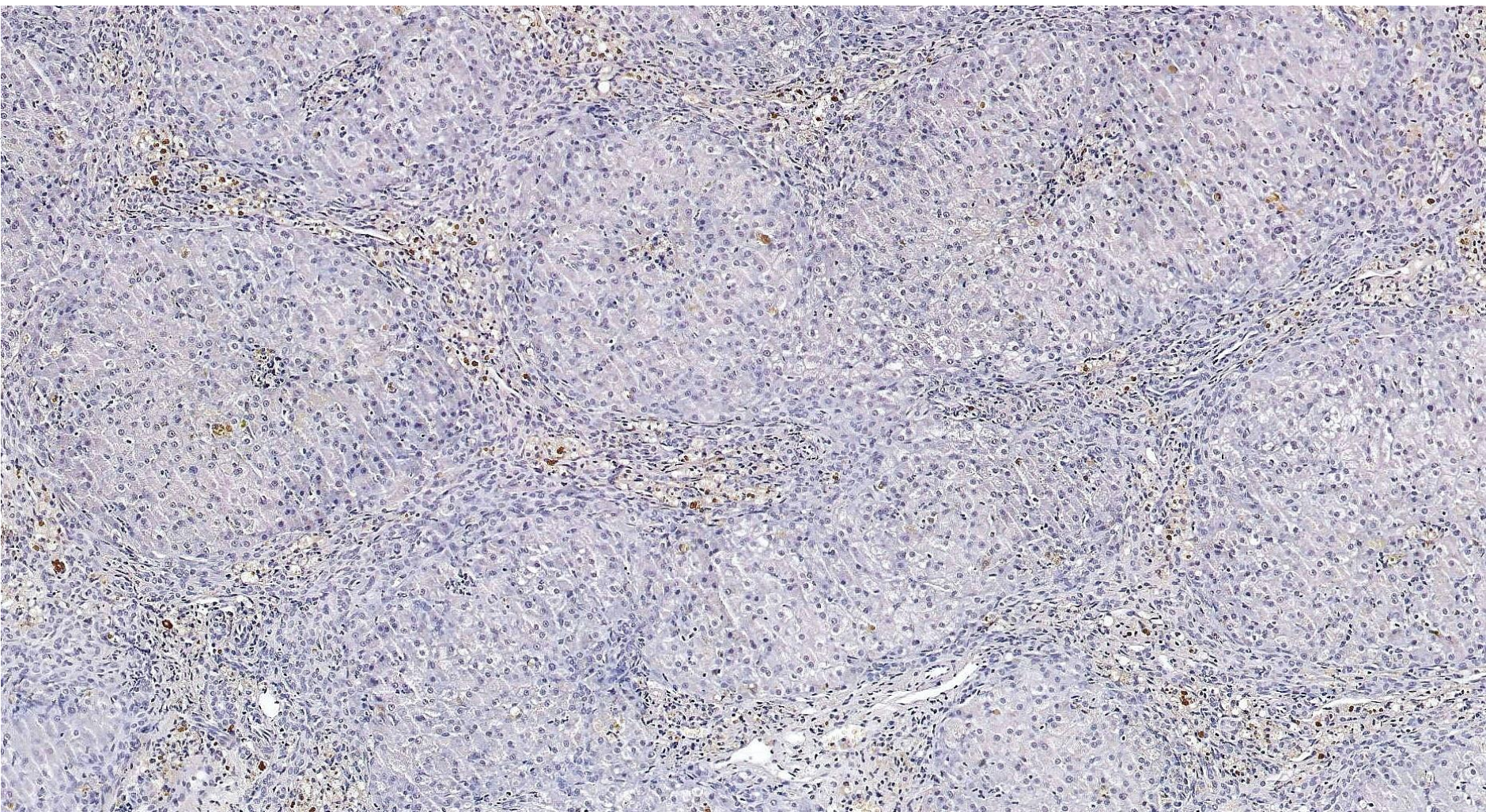
Goldner Trichromic





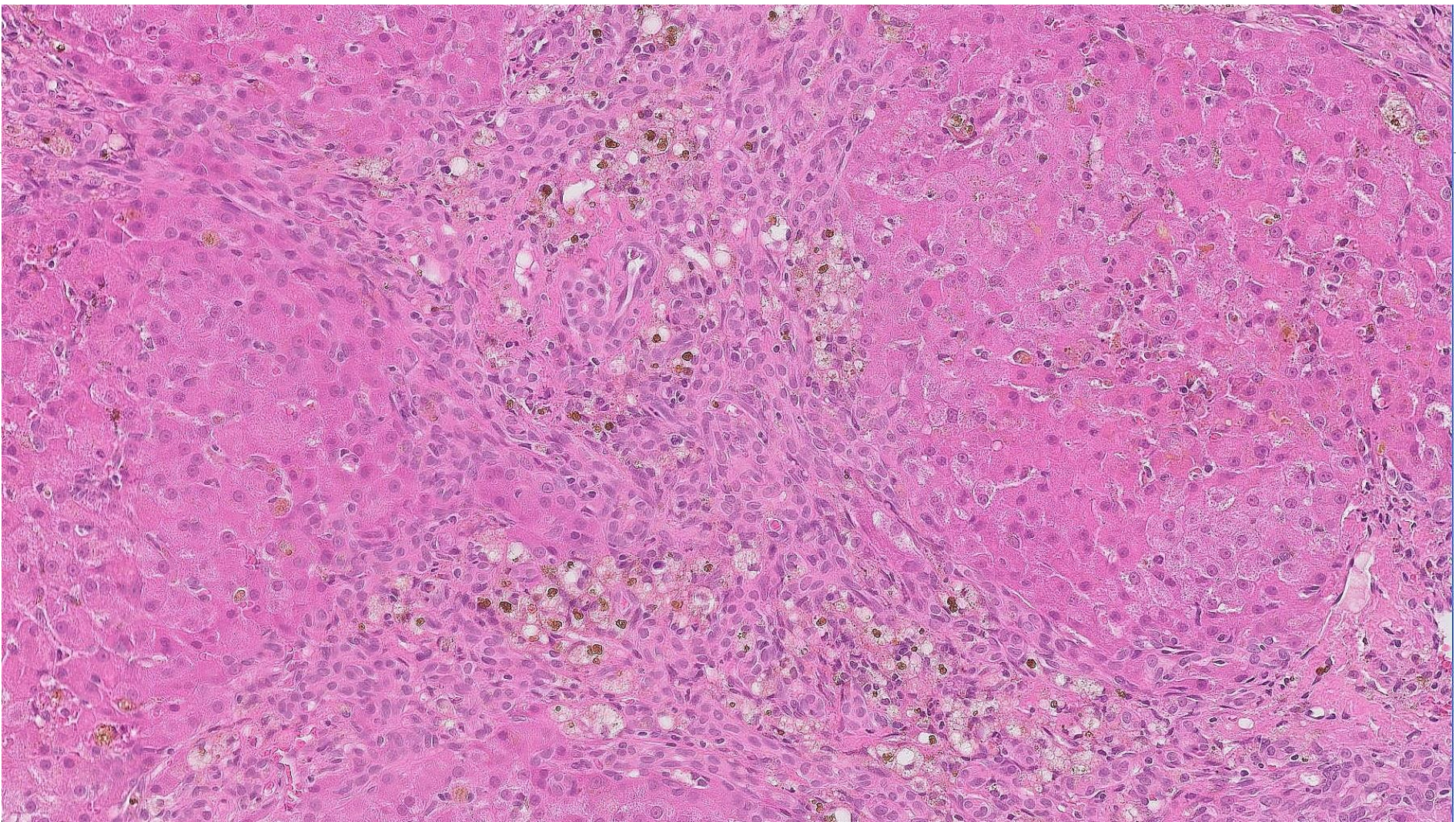
Weigert-Van Gieson





Rubeanic acid for copper





Proliferation of biliary ducts



Case #4

- Cat, DSH Cocker spaniel, 1-years-old, male
- Mass in ear canal
 - FNCS of the mass
 - MGG stain



Cytologic findings

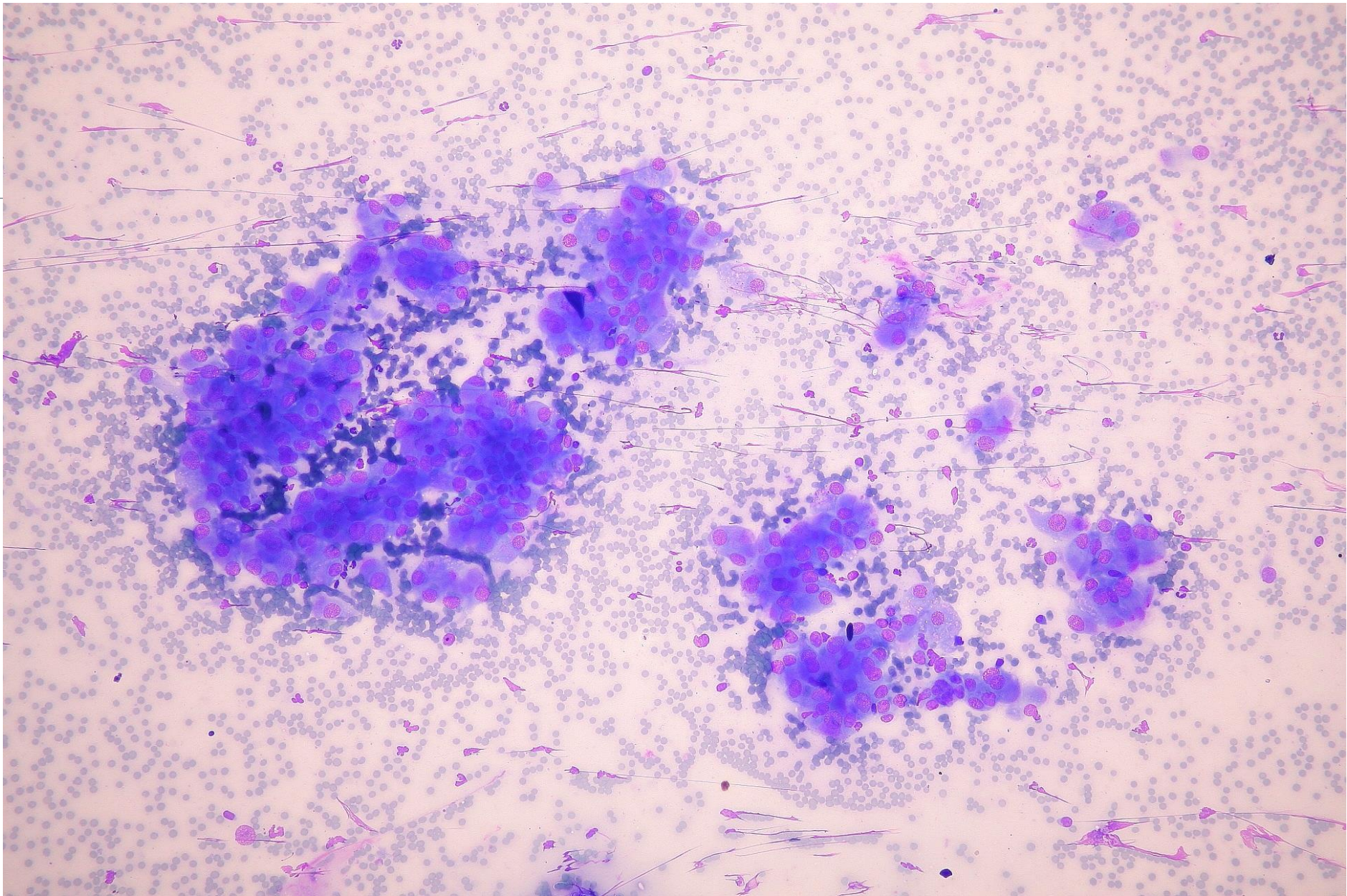
- Bloody and proteinaceous background
- Discohesive aggregated
 - Many epithelial cells
 - Columnar-shaped, ciliated cells
 - Globet cells
 - Mild anisocytosis and anisokaryosis
- Inflammatory cells
 - Neutrophils
 - Lymphocytes



Cytologic diagnosis

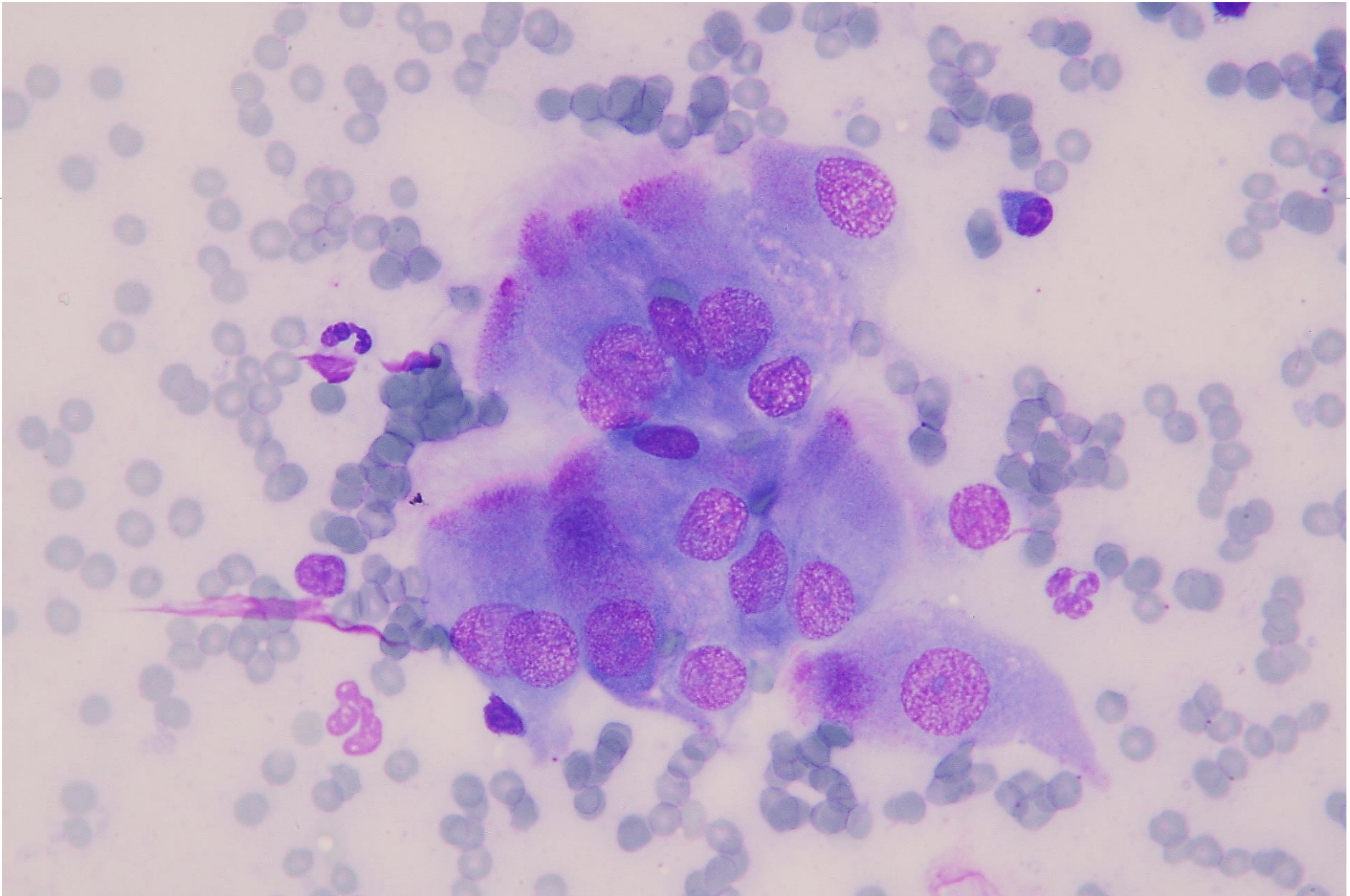
- Benign epithelial proliferation, morphologically suggestive of aural inflammatory polyp, with secondary inflammation
- Histologic examination: aural inflammatory polyp





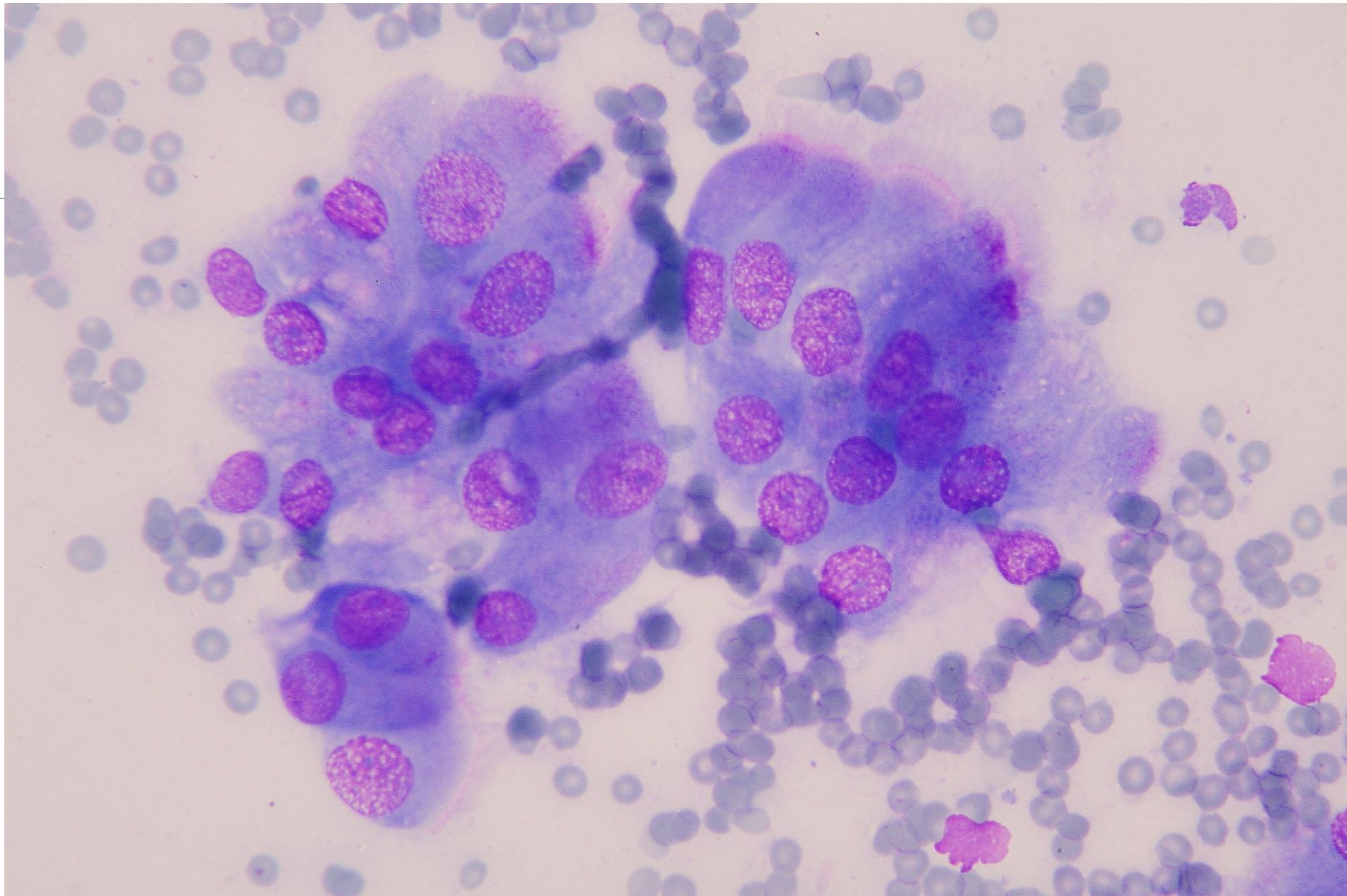
IDEXX International Education

IDEXX
LABORATORIES



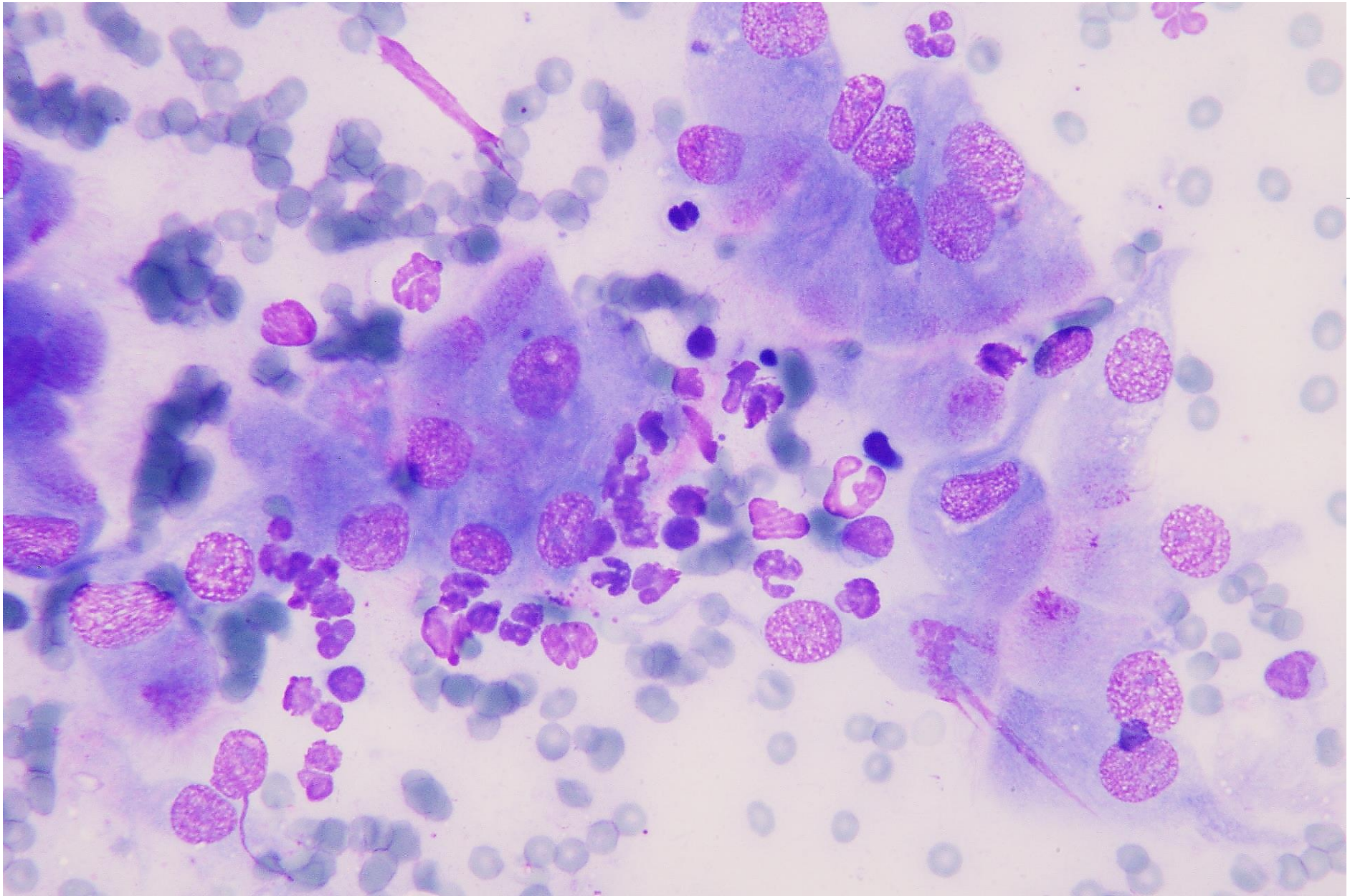
IDEXX International Education

IDEXX
LABORATORIES



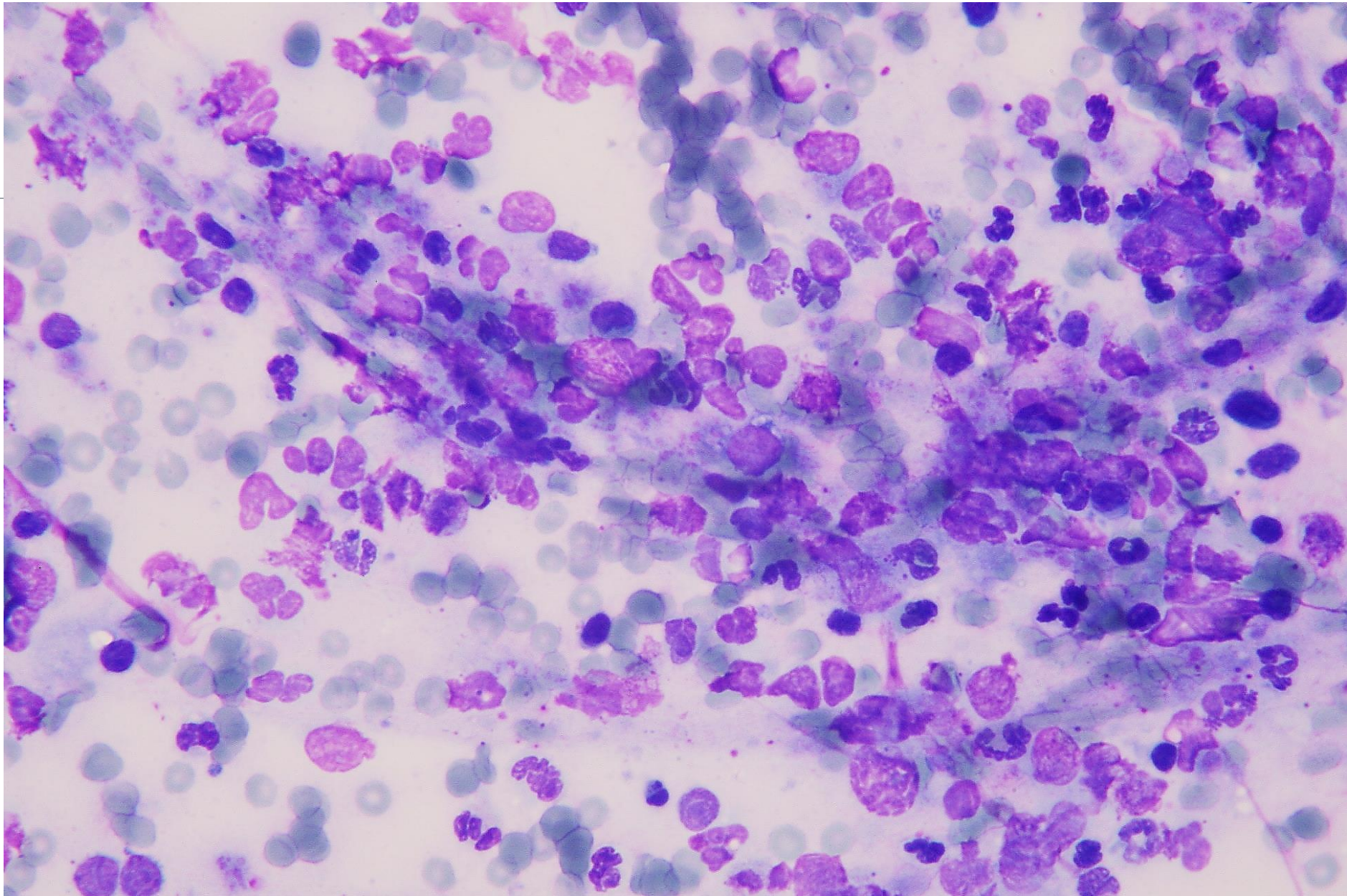
IDEXX International Education

IDEXX
LABORATORIES



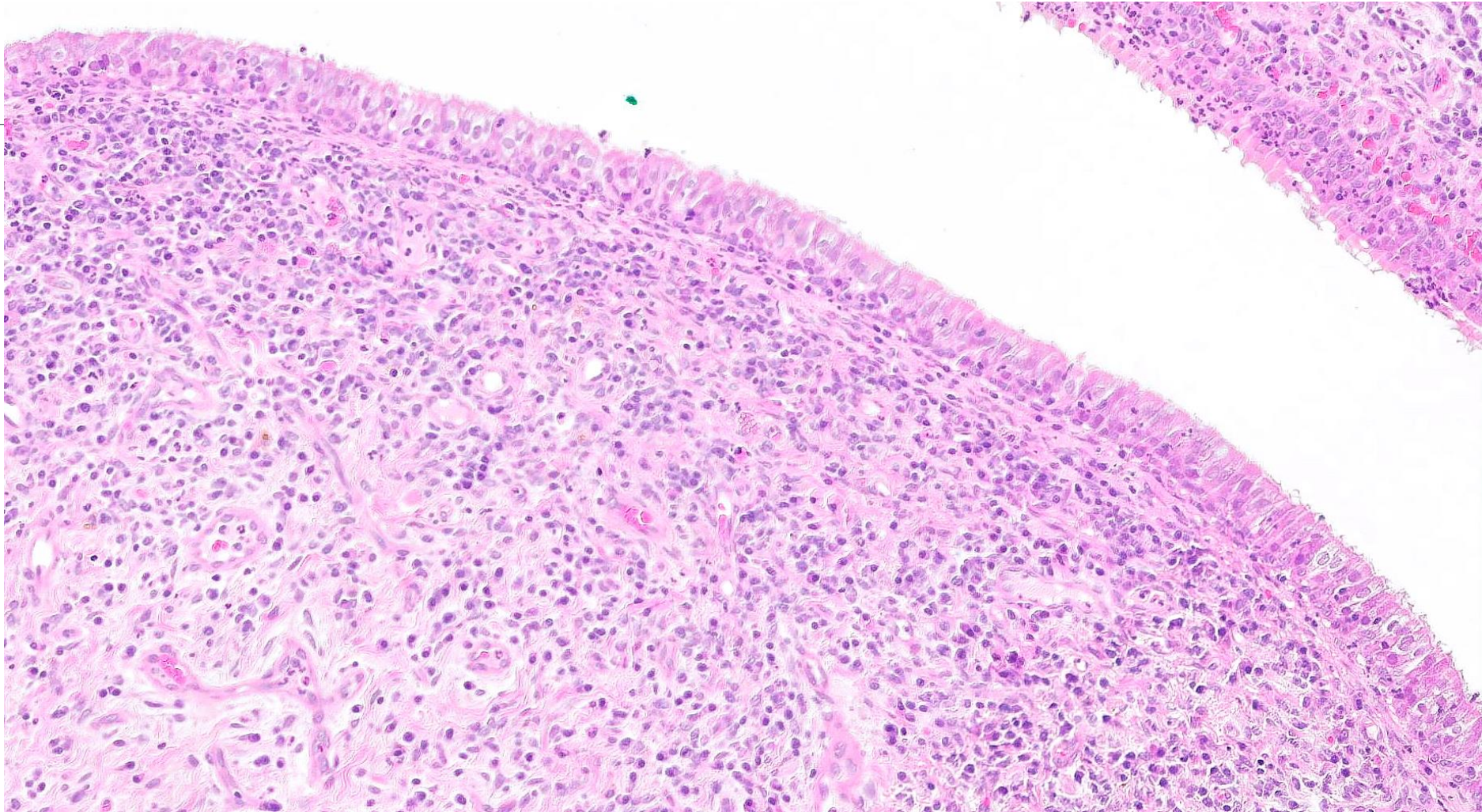
IDEXX International Education

IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES



Histologic diagnosis: aural inflammatory polyp



IDEXX International Education

IDEXX
LABORATORIES

Aural inflammatory polyps

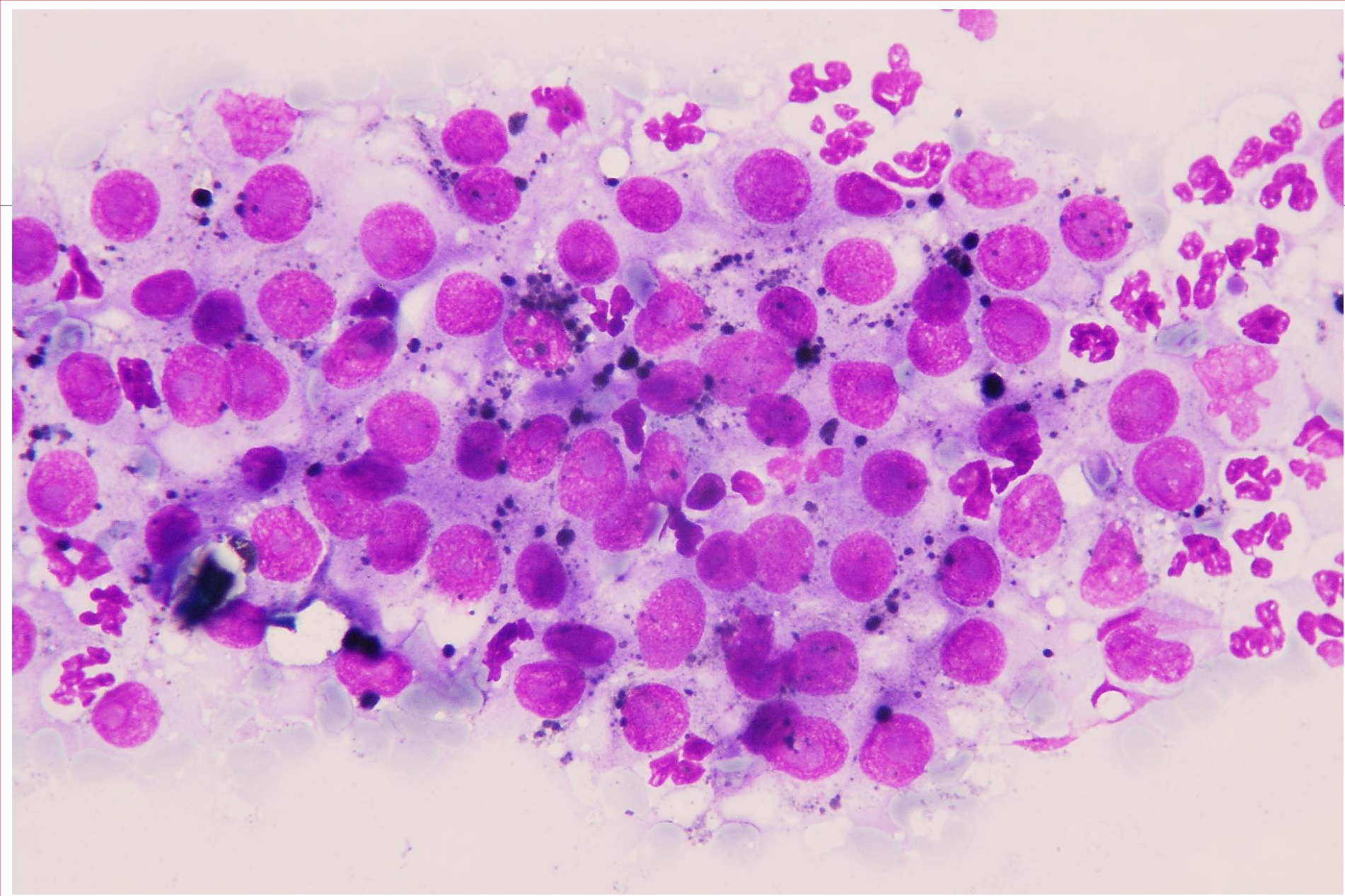
- Non-neoplastic, peduncolated masses, that originate in the middle(external)-ear canal
 - Chronic inflammation
 - Viral (controversed!!)
 - Bacterial
- Young cats most commonly affected
- Affected dogs range from 7 months to 13 years old
- Outer epithelial coat reflective of site of origin
 - Mucoperiosteum: **ciliated cells, together with goblet cells**
 - sometimes non-ciliated, cuboidal to columnar, non cornifying cells
 - External ear canal: stratified, squamous epithelial cells



Case #5

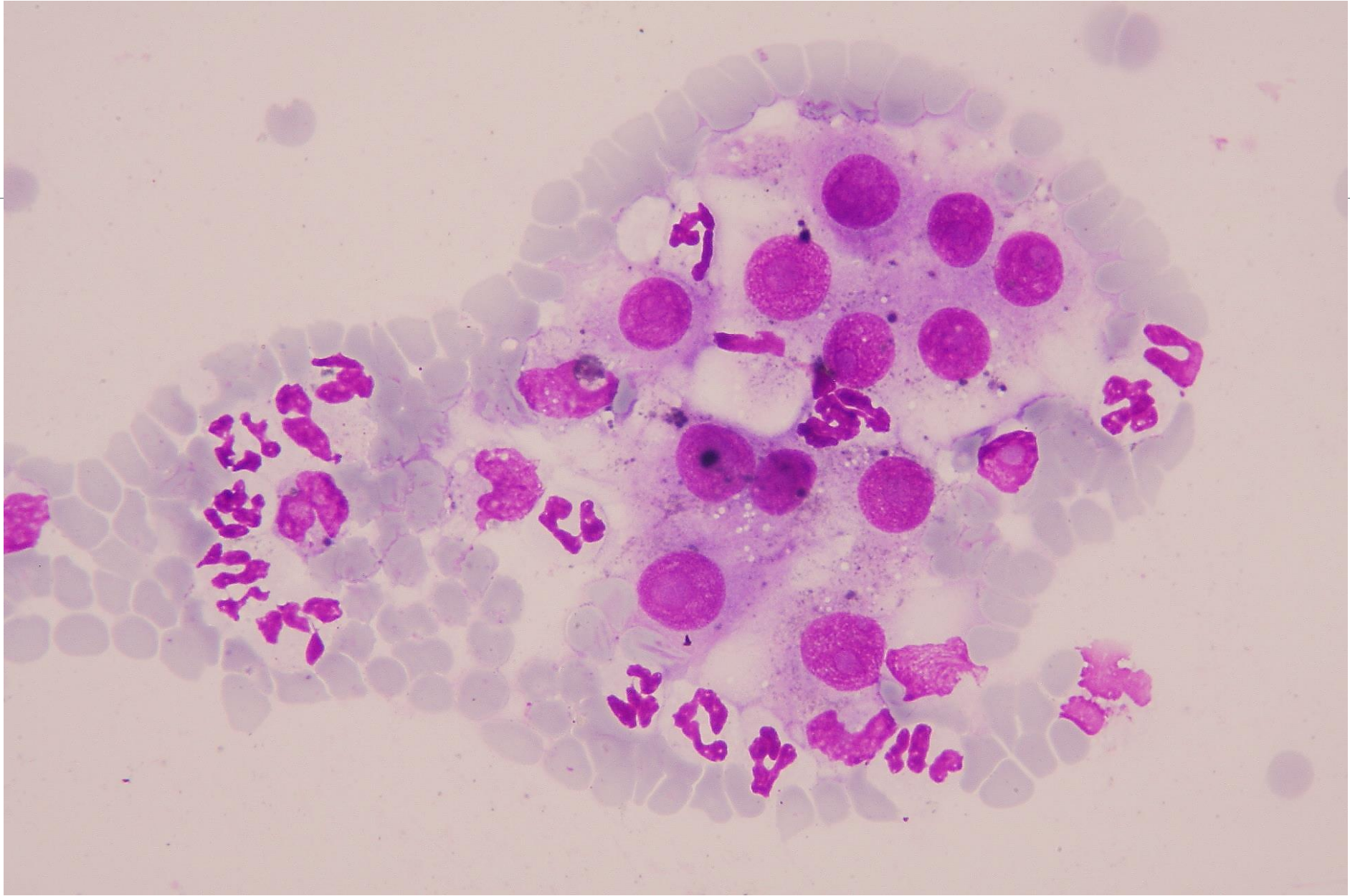
- Dog, Golden retriever, male, 15-years-old
- Mediastinal mass
- Pleural effusion
 - PS: 1022; TP: 2,6g/dl
- History: previous surgical removal of mandibular mass





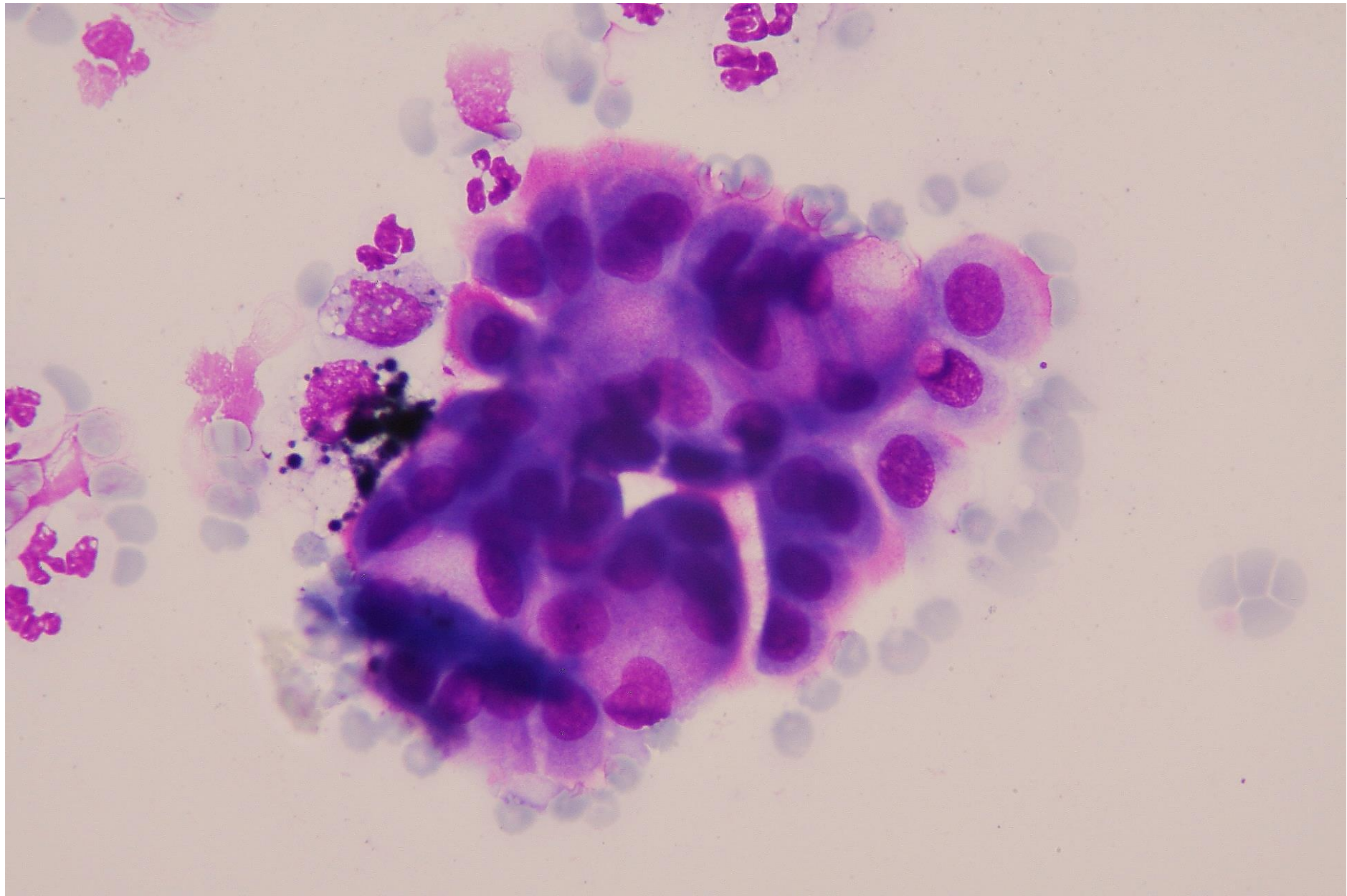
IDEXX International Education

IDEXX
LABORATORIES



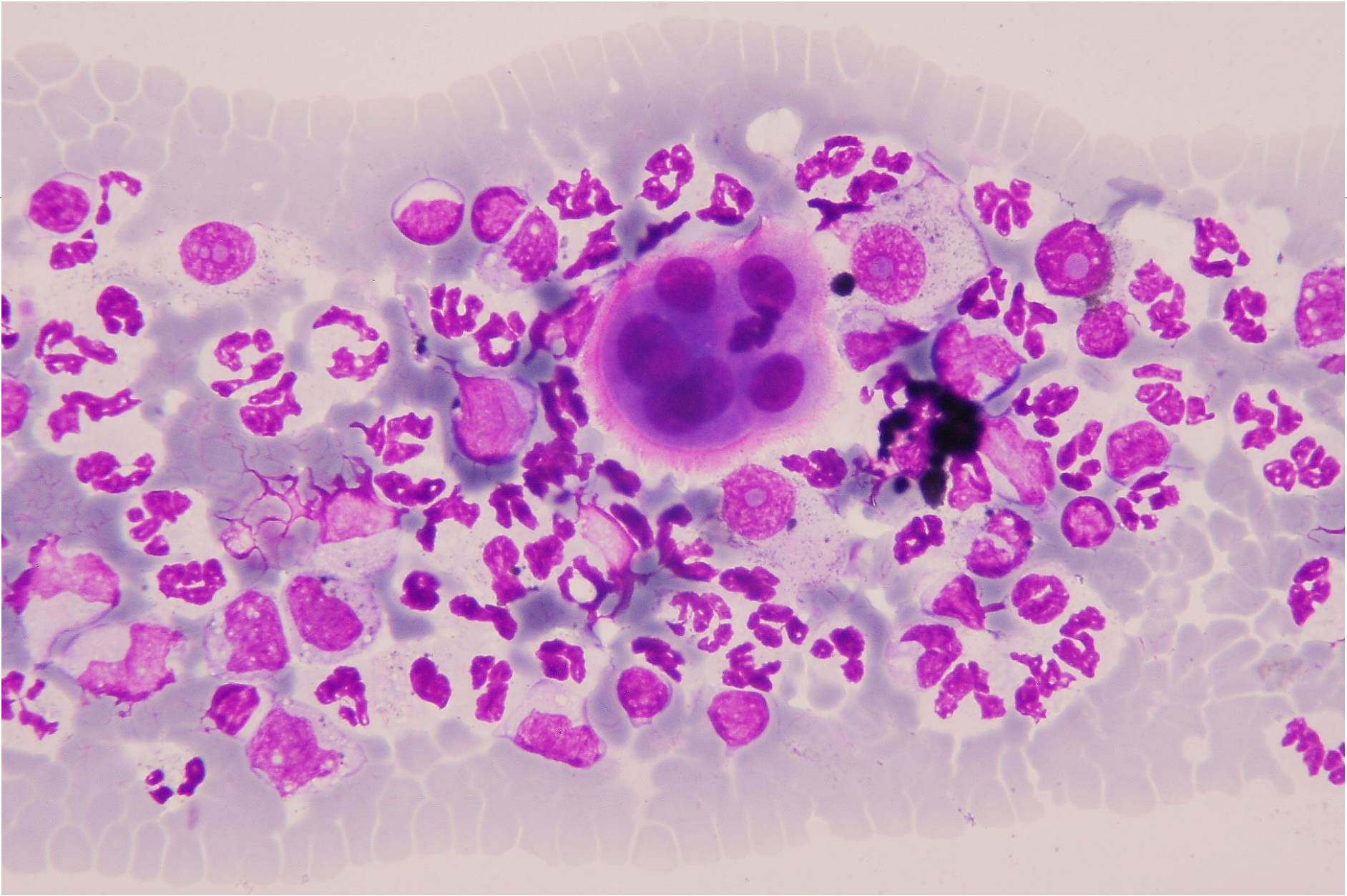
IDEXX International Education

IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES

Cytologic findings

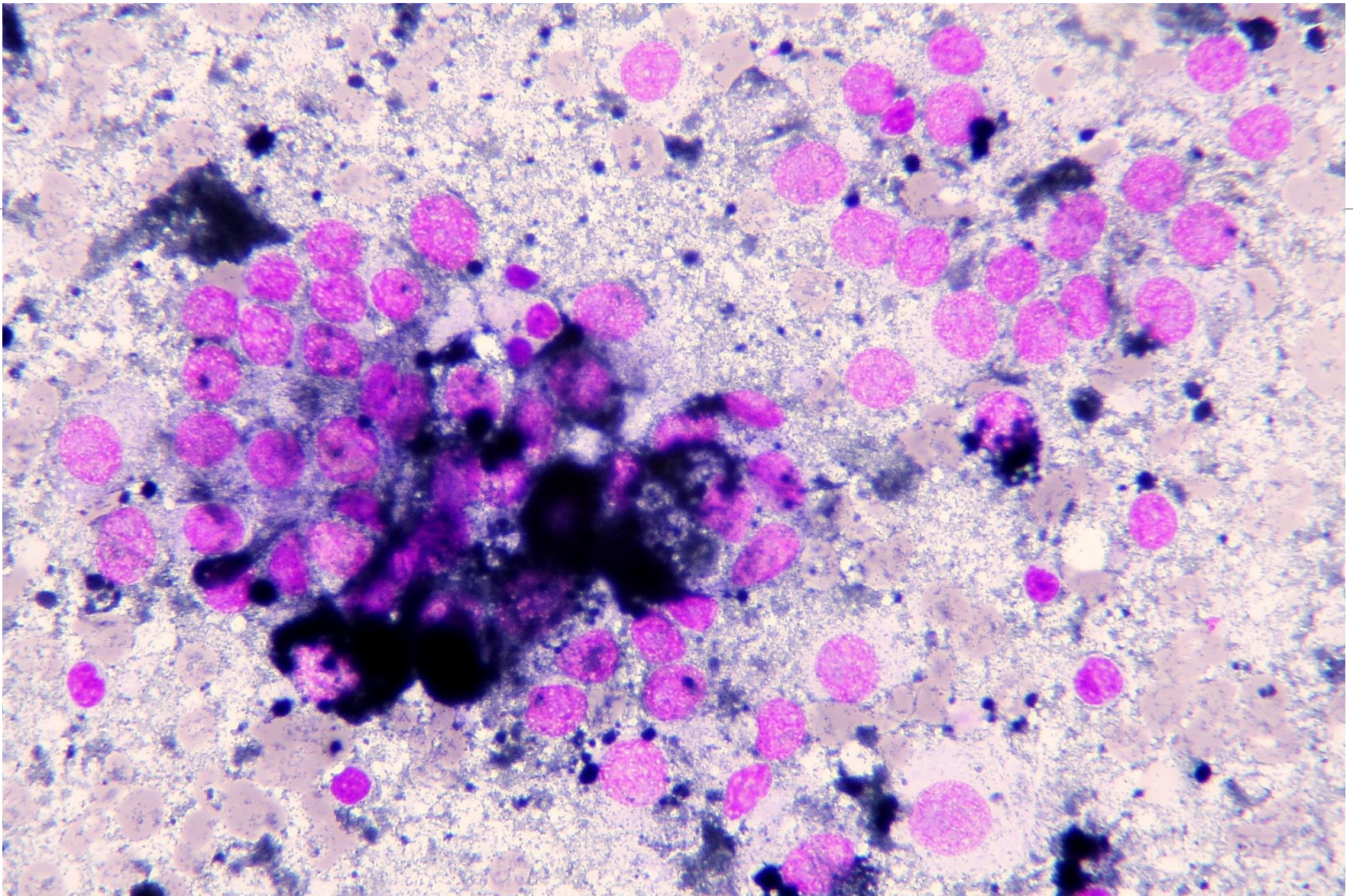
- Large “epithelioid” atypical cells
 - Eosinophilic cytoplasm
 - Black, sometimes clumped granules
 - Large nucleus
 - Round shape
 - Clumped chromatin
 - Macronucleoli
- Reactive mesothelial cells
- Inflammatory cells
 - Well preserved neutrophils
 - Macrophages in melanophagocytosis



Cytologic diagnosis

- Coelomatic metastasis of malignant melanoma





Retromandibula lymphnode: metastasis (??) of malignant melanoma



Metastasis of malignant melanoma

- Described sites of metastasis (Munday, 2017):
 - Regional lymph nodes
 - Distant sites
 - Lung most commonly affected
 - Often miliary metastases, not clinically detectable



Metastasis of malignant melanoma

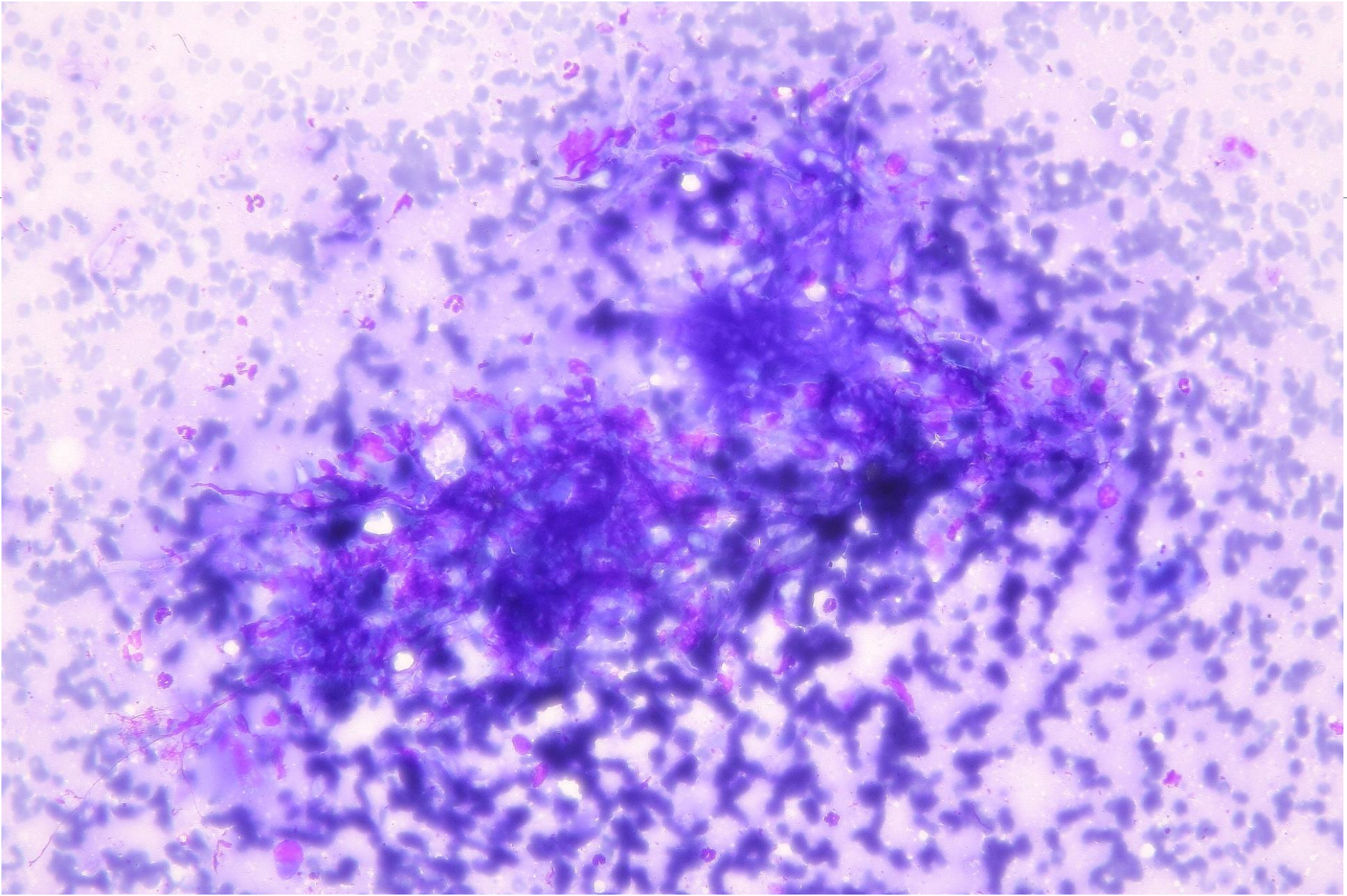
- Morges MA, Zaks K. Malignant melanoma in pleural effusion in a 14-year-old cat. J Feline Med Surg. 2011 Jul;13(7):532-5.
- Bertoy RW, Brightman AH, Regan K. Intraocular melanoma with multiple metastases in a cat. J Am Vet Med Assoc. 1988 Jan 1;192(1):87-9.
- Kasbohm C. Malignant thoracic metastasizing melanoma with pleural effusion in a dog. Berl Munch Tierarztl Wochenschr. 1969 Dec 15;82(24):485-6.



Case #6

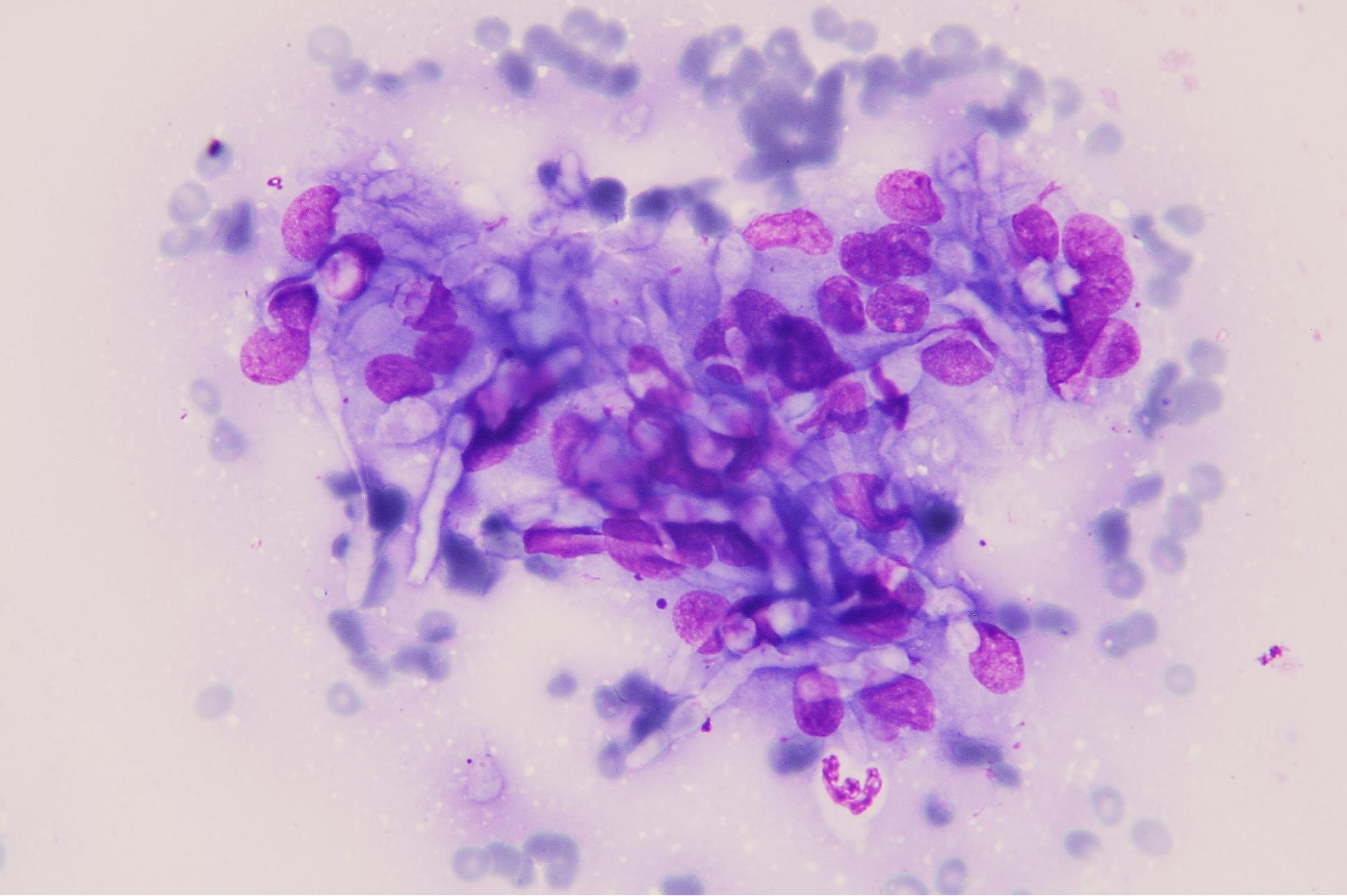
- Dog, mongrel, female, 6-years-old
- Dispnoea
- Mediastinal mass
 - Generalized lymphomegaly
 - Pleural effusion (PS: 1028; TP: 3,2 g/dl) 4781
- Sample from mediastinal mass (lymph node?)
 - FNCS
 - MGG stain
- Flushing of pleural effusion

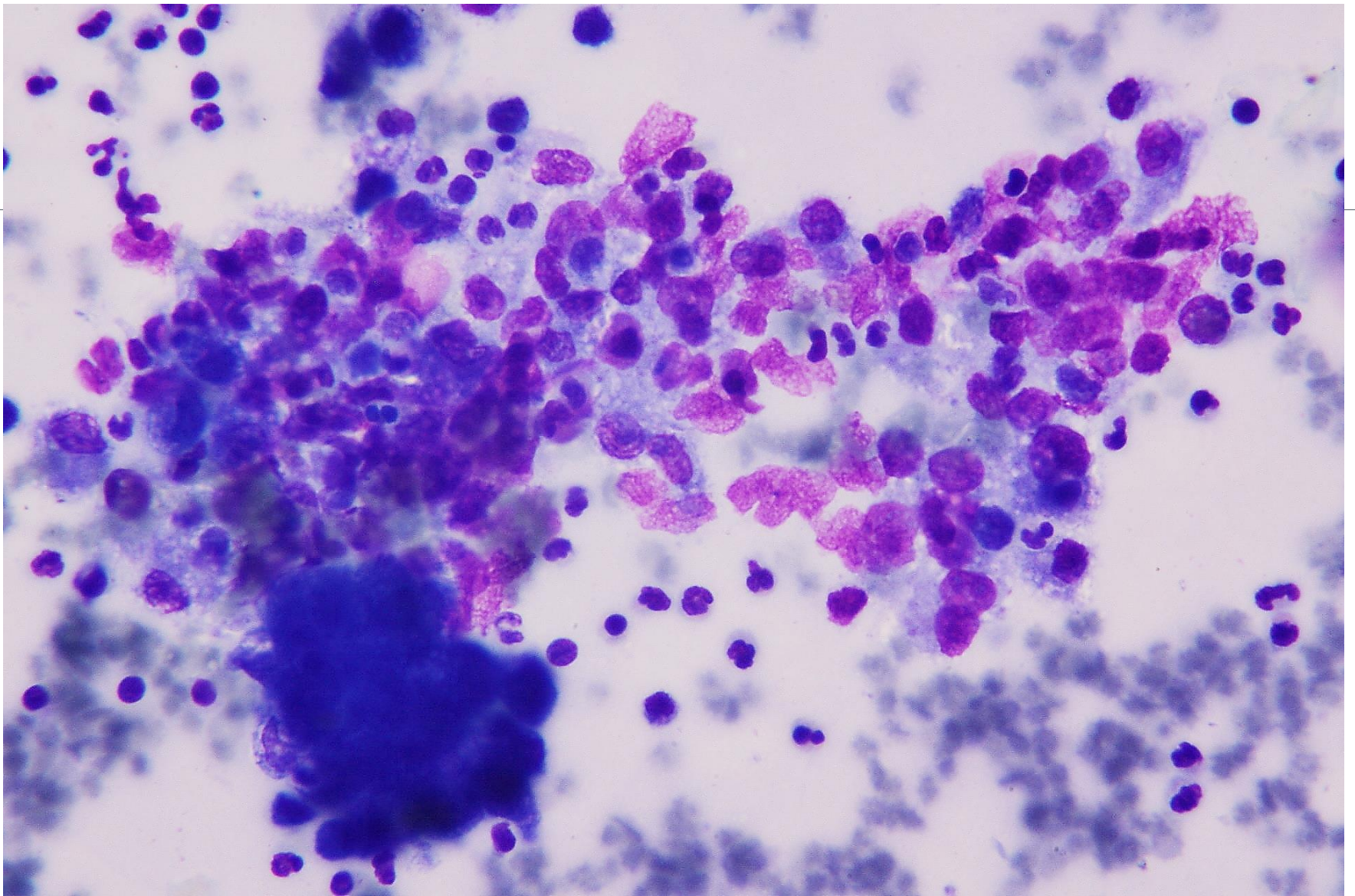




IDEXX International Education

IDEXX
LABORATORIES





Pleural effusion; sediment



Cytologic findings

- Inflammatory cells
 - Macrophages
 - Sometimes in aggregates
 - Very rare neutrophilic granulocytes
- Many fungal hyphae
 - Elongated
 - Ramified



Cytologic diagnosis

- Fungal infection (granulomatous fungal lymphadenitis ??)
- PCR: *Paecilomyces* spp



Watt PR, Robins GM, Galloway AM, O'Boyle DA.

Disseminated opportunistic fungal disease in dogs: 10 cases (1982-1990). J Am Vet Med Assoc. 1995 Jul 1;207(1):67-70.

- Medical records of 10 dogs in which fungal infection was diagnosed.
 - Nine dogs were German Shepherd Dogs
 - All 10 dogs had evidence of multiple sites of diskospondylitis
- In each dog, infection was determined to be caused by a single species of fungus
 - *Aspergillus terreus*
 - *Penicillium* sp
 - *Paecilomyces* sp,
 - *Chrysosporium* sp
 - *Pseudallescheria boydii*



Gené J, Blanco JL, Cano J, García ME, Guarro J. **New filamentous fungus *Sagenomella chlamydospora* responsible for a disseminated infection in a dog.** J Clin Microbiol. 2003 Apr;41(4):1722-5.

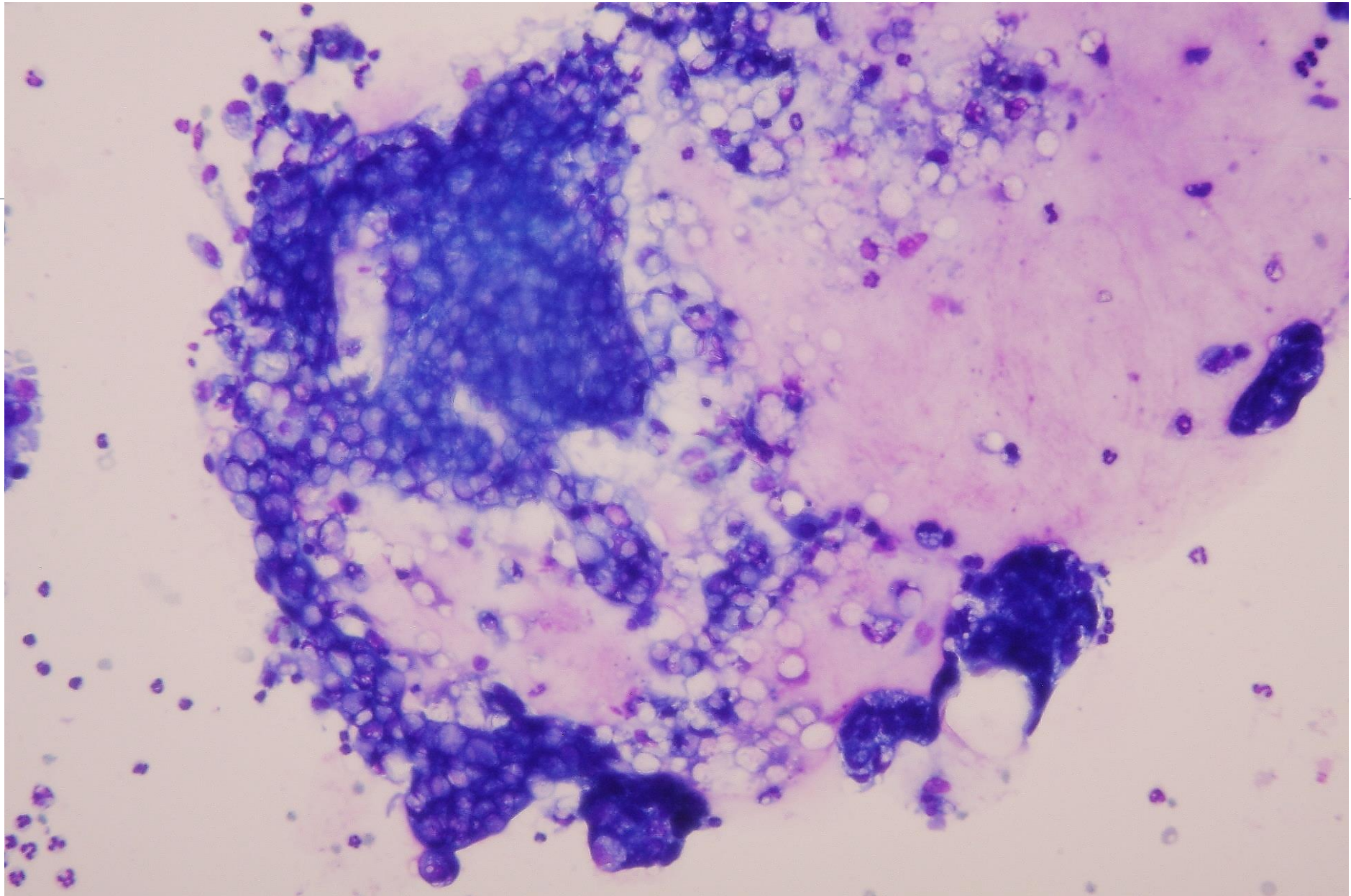
- A filamentous fungus that caused a fatal systemic infection in a dog has been identified as the new species *Sagenomella chlamydospora*.
- When the case was initially reported, the fungus was identified as *Paecilomyces* sp.
- This study emphasizes how difficult can be the identification of the causative agent of an infection when an uncommon microorganism is involved.



Case #7

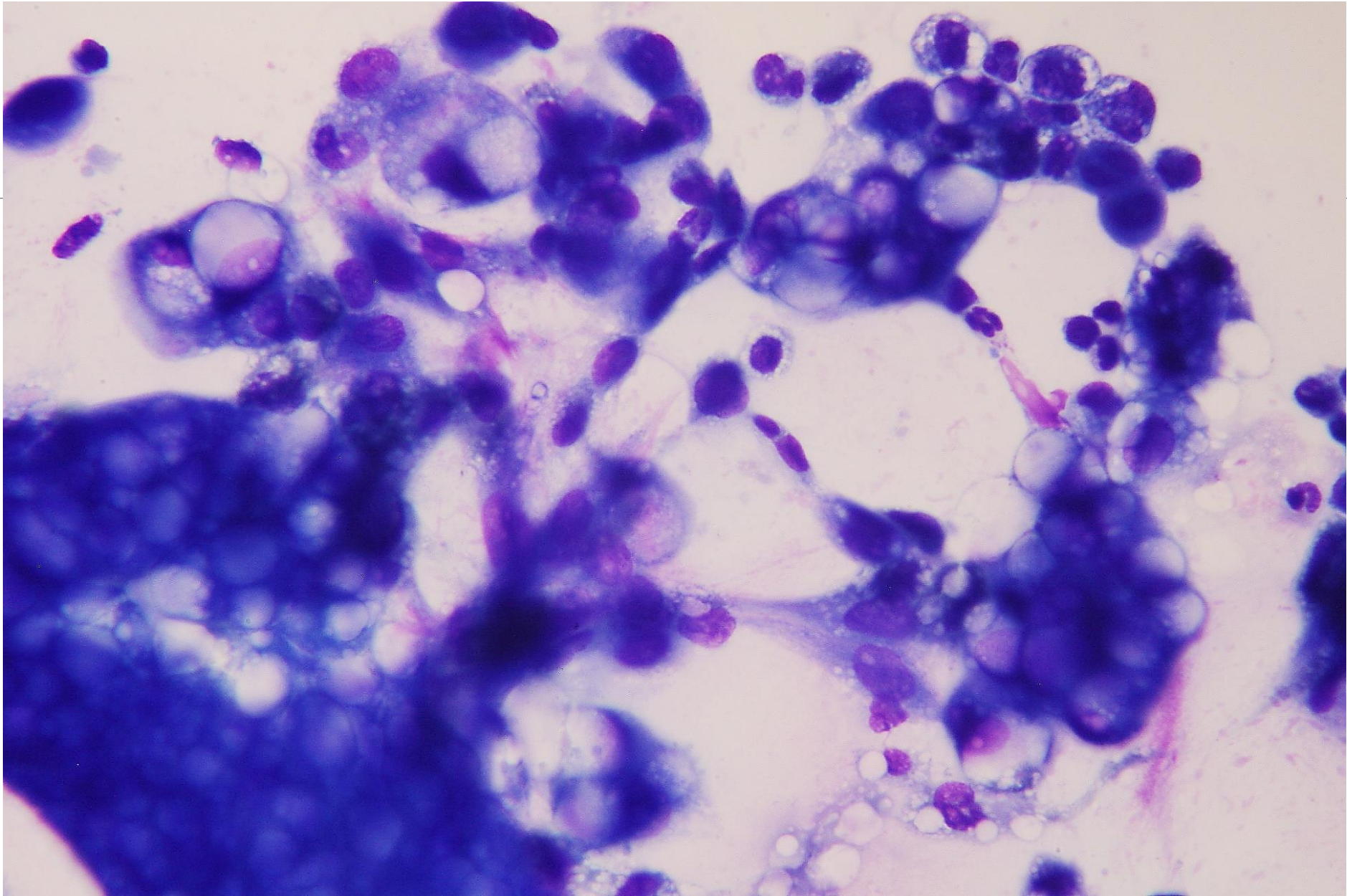
- Dog, Belgian shepherd, 9-years-old, male
- Vomiting from some weeks
- Abdominal effusion
 - (PS: 1038; TP: 4,5 g/dL; TCC: >10000 C/mcL)
 - Direct smear and sediment
 - MGG stain





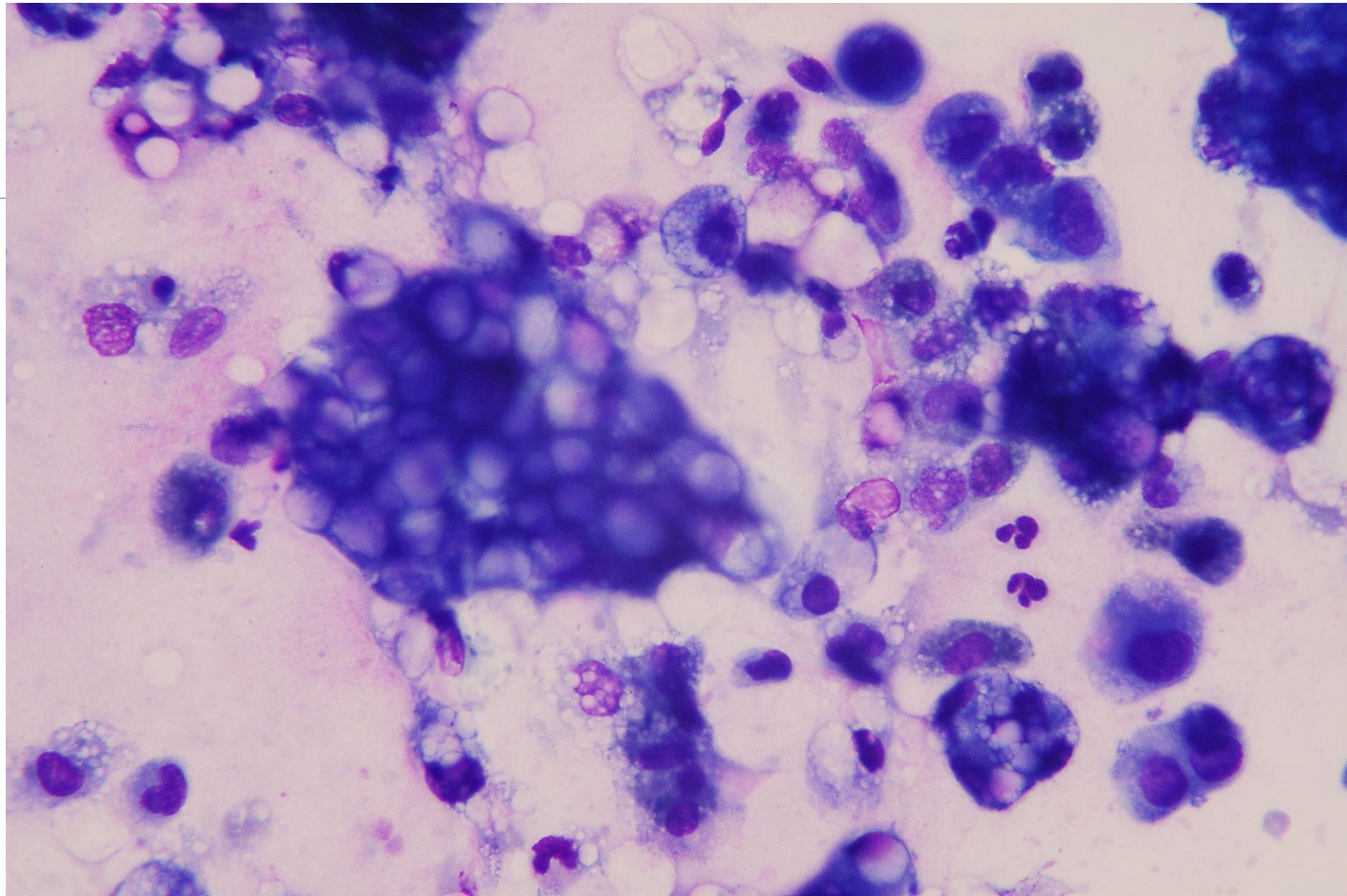
IDEXX International Education

IDEXX
LABORATORIES



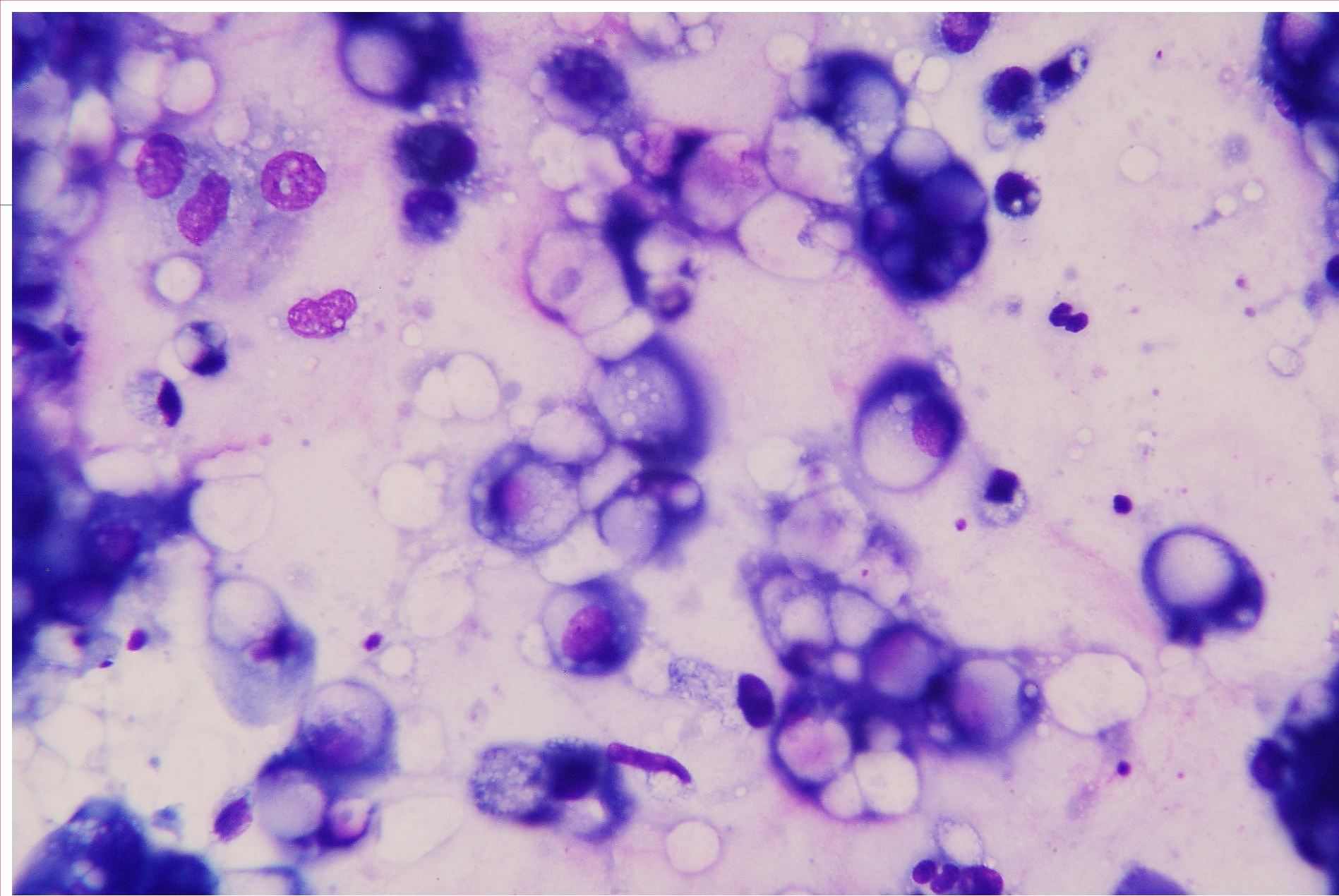
IDEXX International Education

IDEXX
LABORATORIES



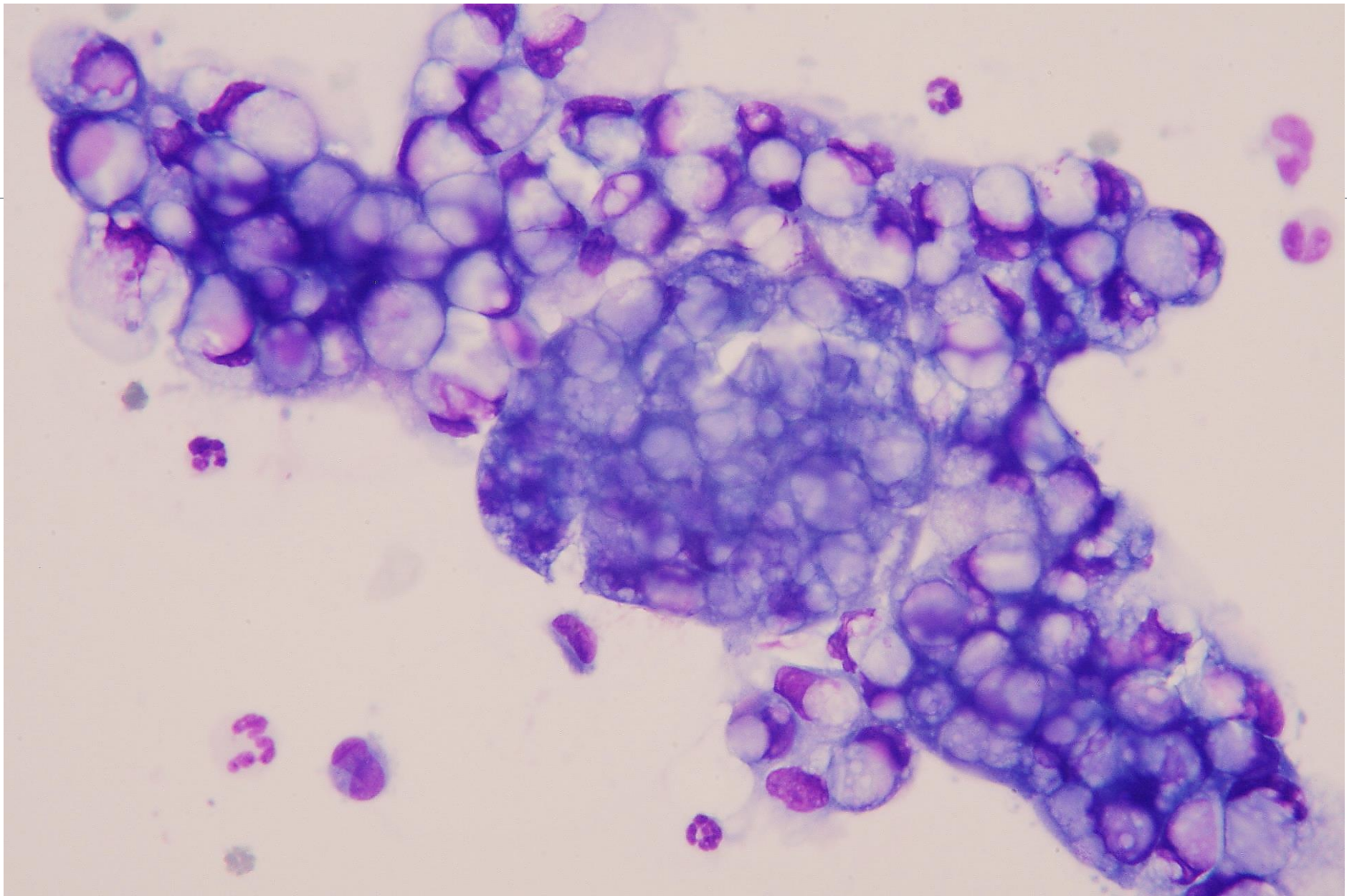
IDEXX International Education

IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES

Cytologic findings

- Large aggregates of epithelial cells
 - Round, bluish cytoplasm
 - Large achromatic globules
 - Round to ovoid nucleus, displaced in periphery
 - So called “signet-ring” aspect



Cytologic diagnosis

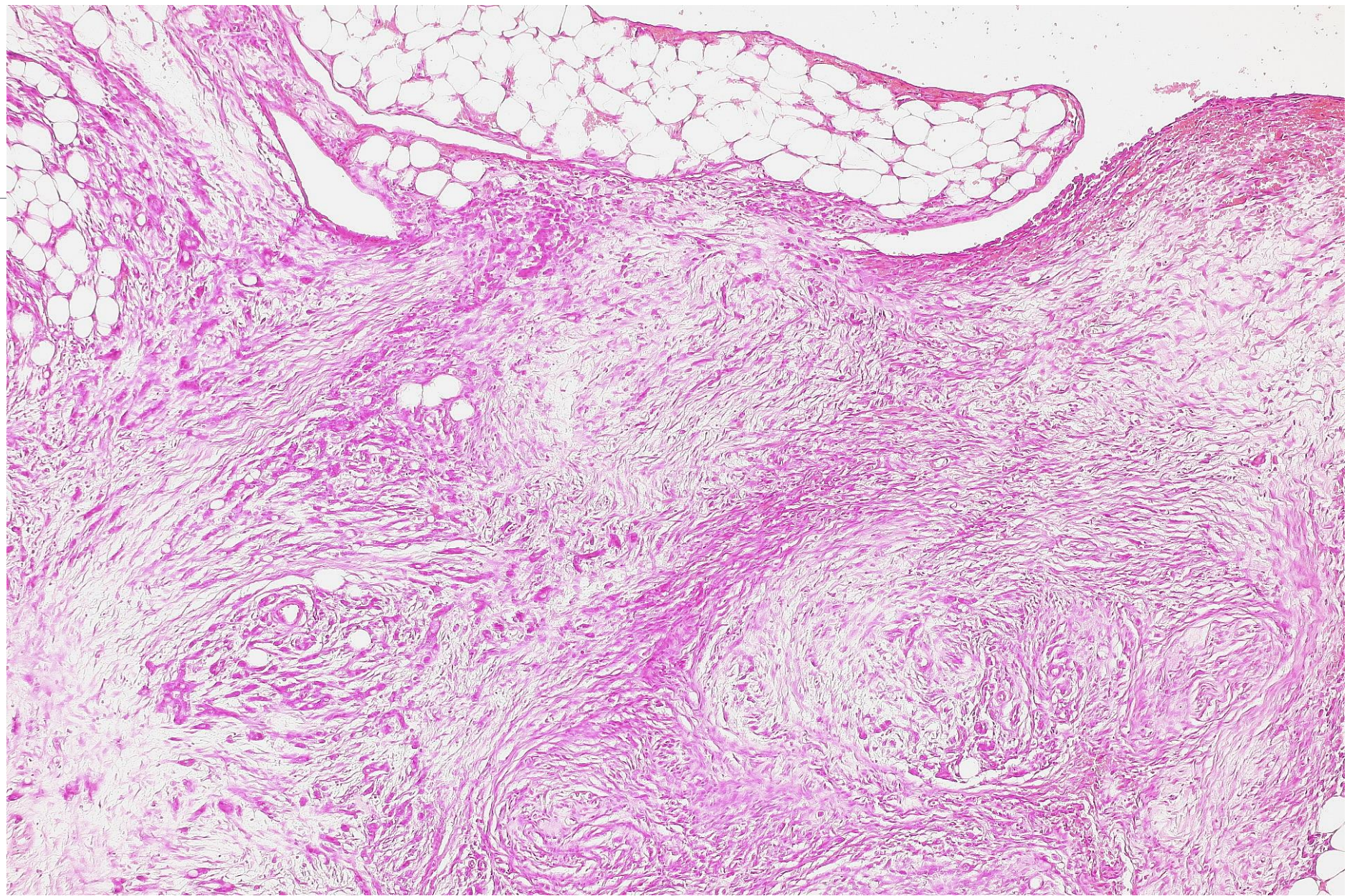
- Coelomatic metastasis of “signet-ring cells” carcinoma
 - Gastric
 - Intestinale
 - Other??
- Histologic diagnosis: gastric “signet-ring cell” carcinoma, with multiple metastases



Metastases of gastric adenocarcinoma

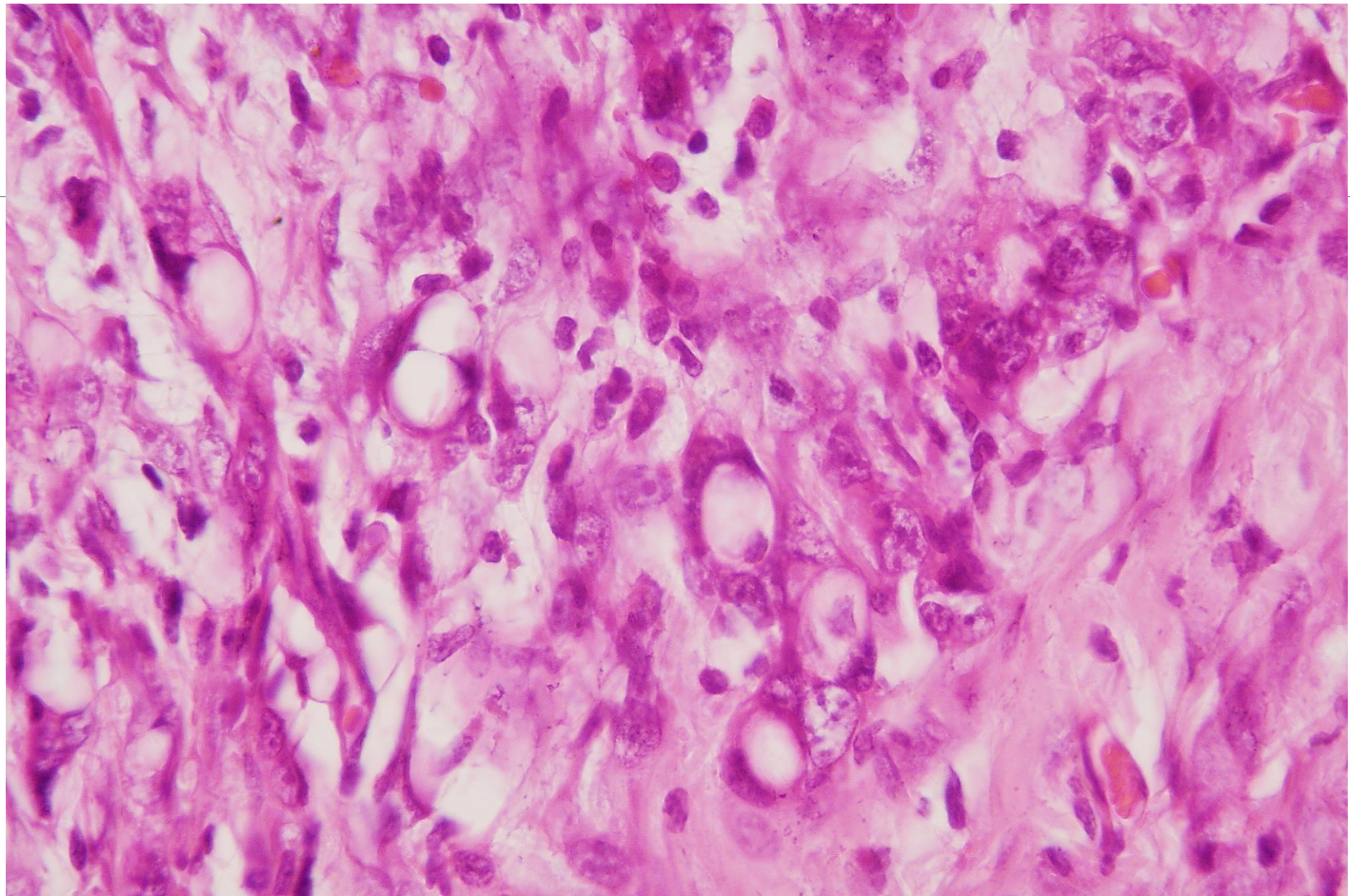
- Since the clinical signs are non specific, neoplasms are typically advanced at diagnosis (Munday, 2017)
- High metastatic potential
 - 70% nodal metastases at diagnosis
 - 15-70% at diagnosis in:
 - Liver
 - Spleen
 - Lung
 - Adrenal glands
- Signet ring cell type: few data for prognostic factor





IDEXX International Education

IDEXX
LABORATORIES



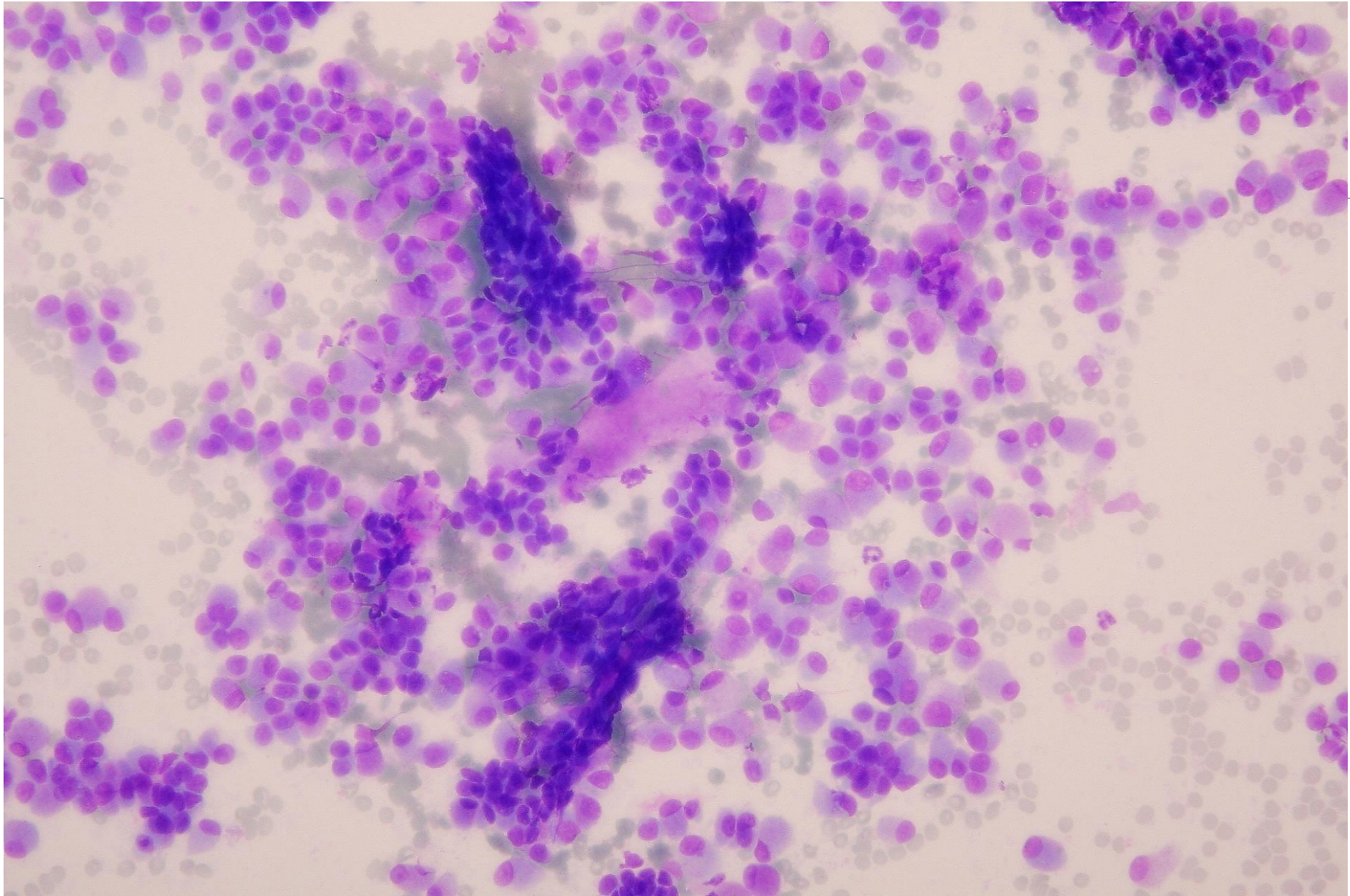
IDEXX International Education

IDEXX
LABORATORIES

Case #8

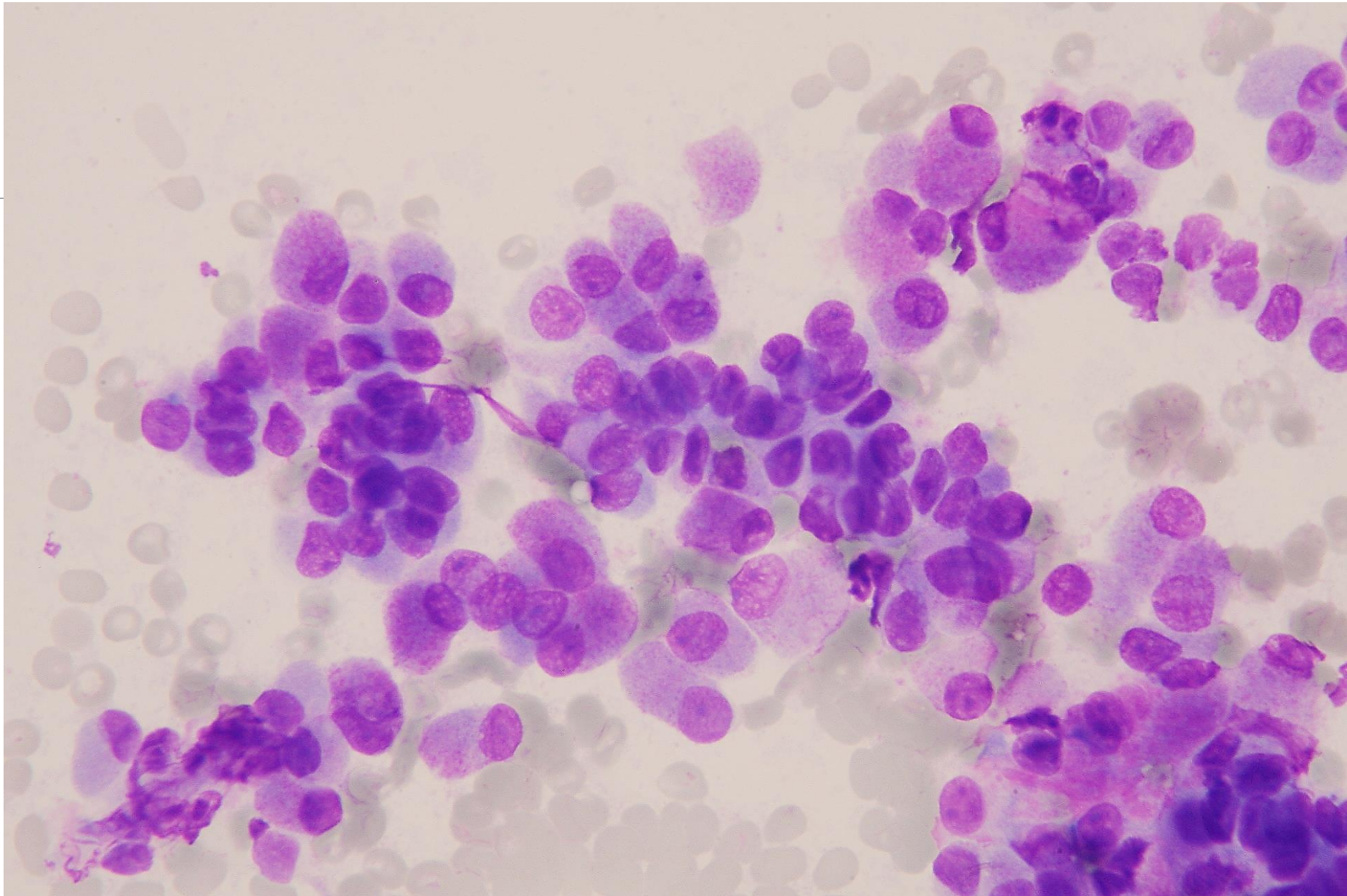
- Dog, mongrel, 8-years-old, female
- Nodule in interdigital region, forelimb
 - FNCS of the mass
 - MGG stain





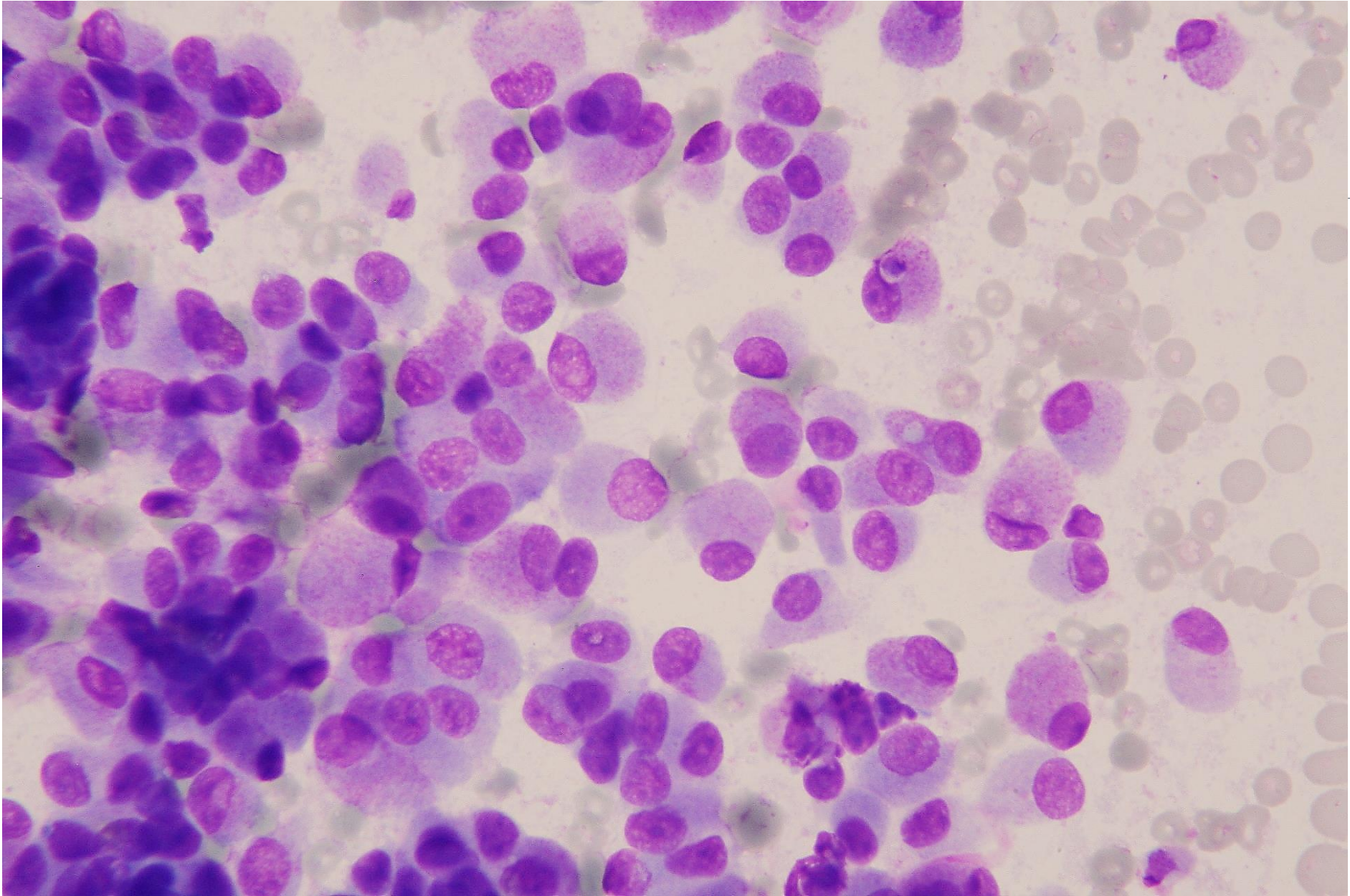
IDEXX International Education

IDEXX
LABORATORIES



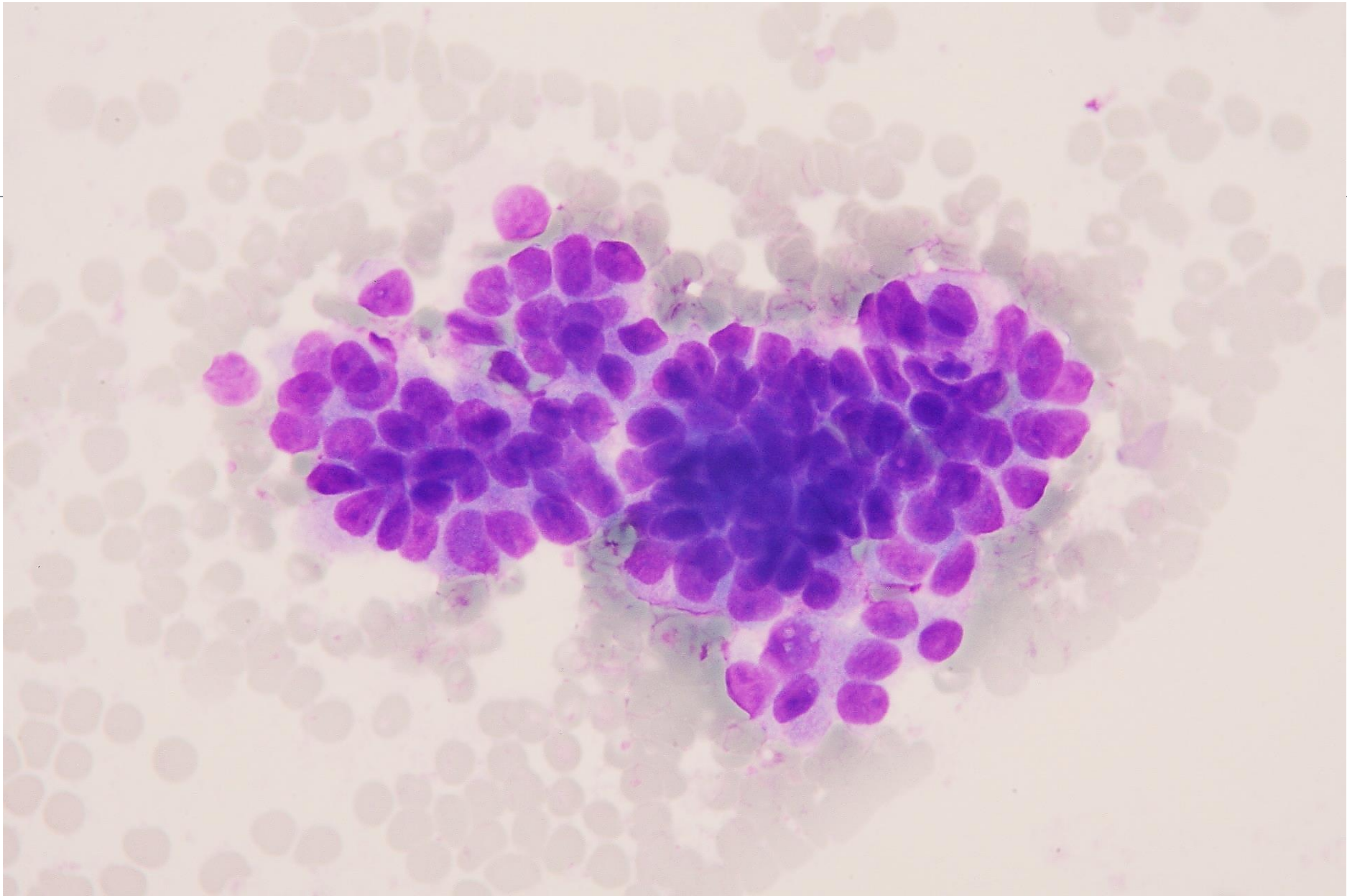
IDEXX International Education

IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES



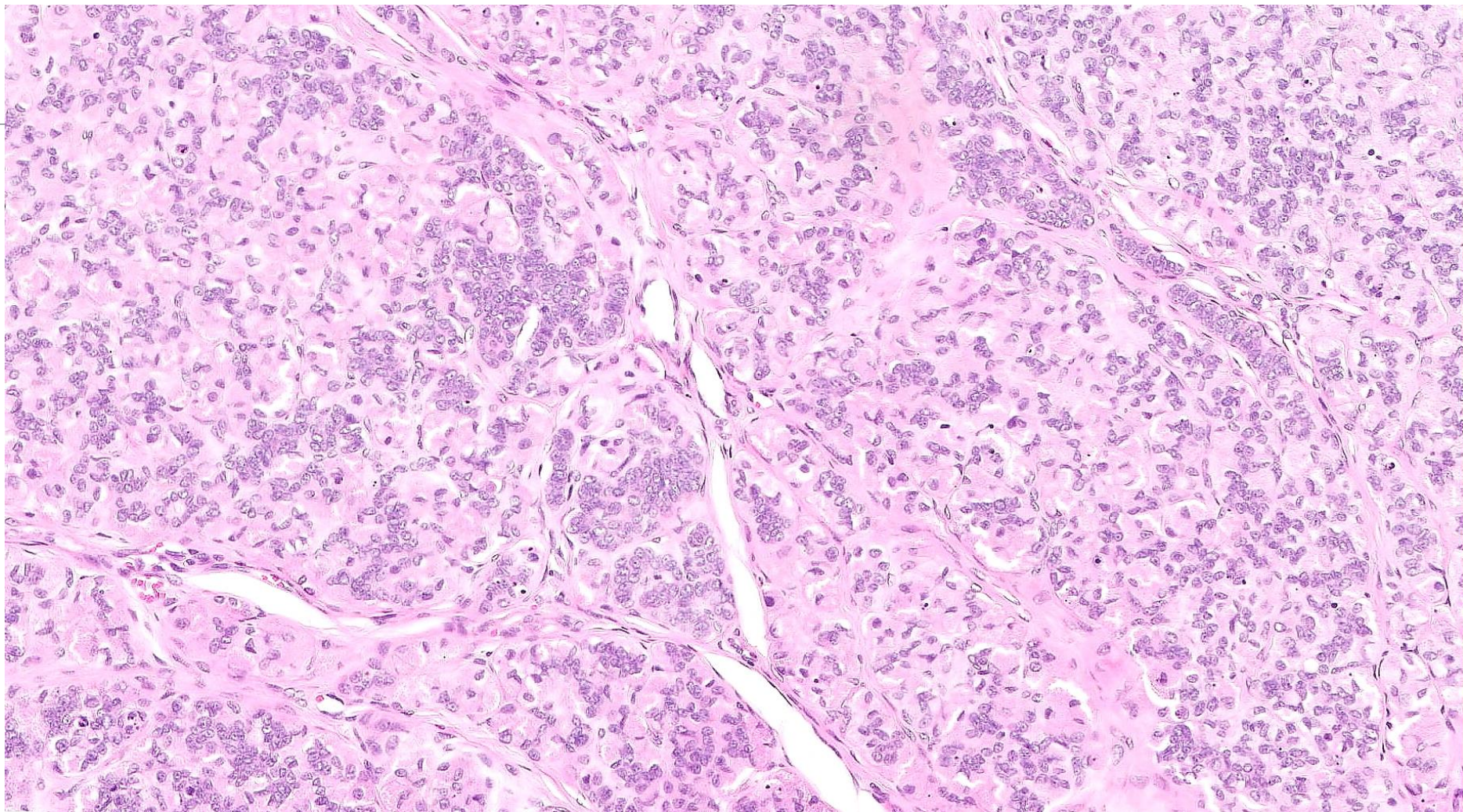
IDEXX International Education

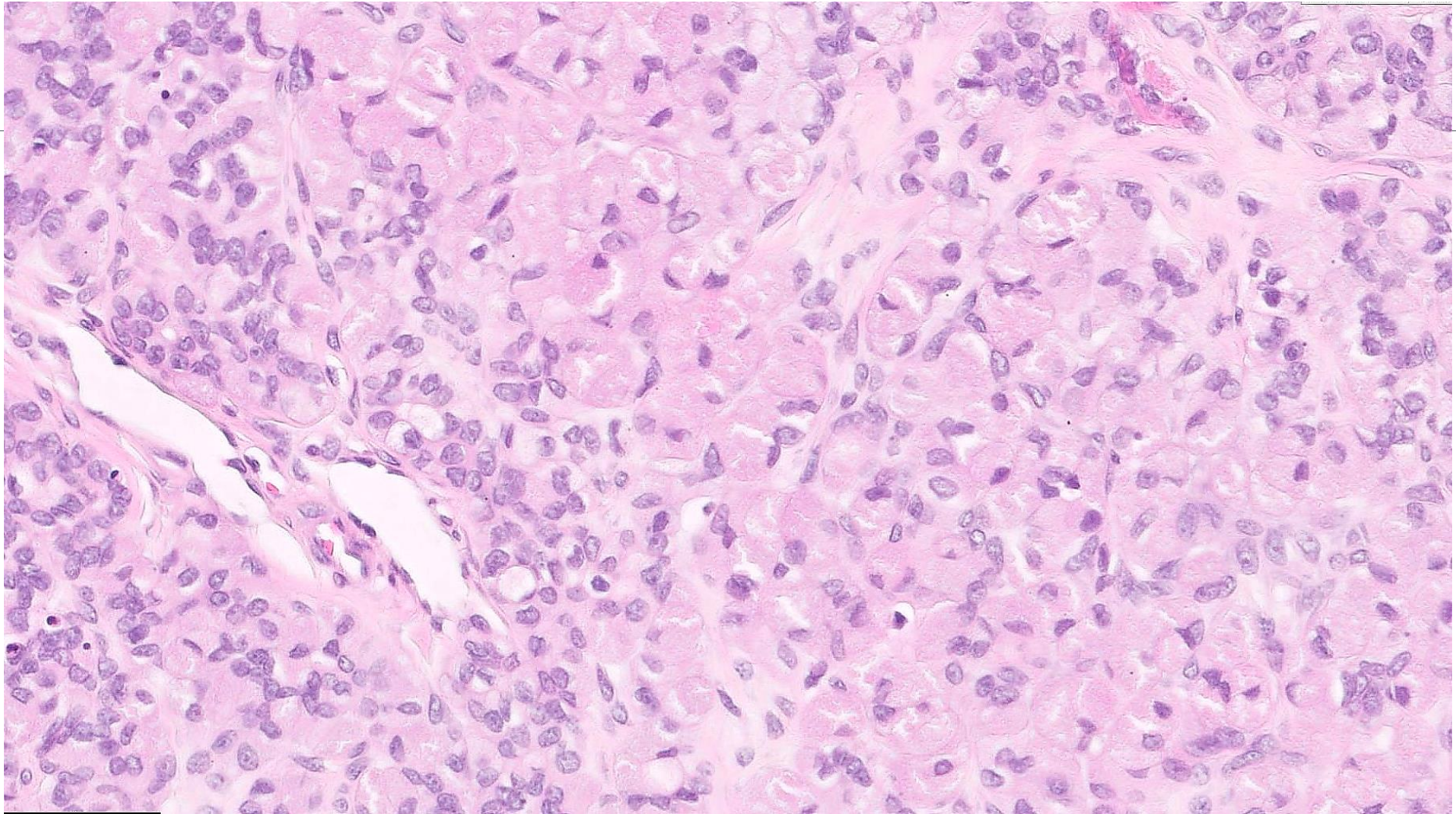
IDEXX
LABORATORIES

Cytologic findings

- Round to ovoid cells
 - Granular, eosinophilic cytoplasm
 - Round nucleus,
 - Finely granular or compact chromatin
- Small aggregates or dispersed singularly
- Occasional “basaloid” rows
- Histologic diagnosis: granular cell trichoblastoma



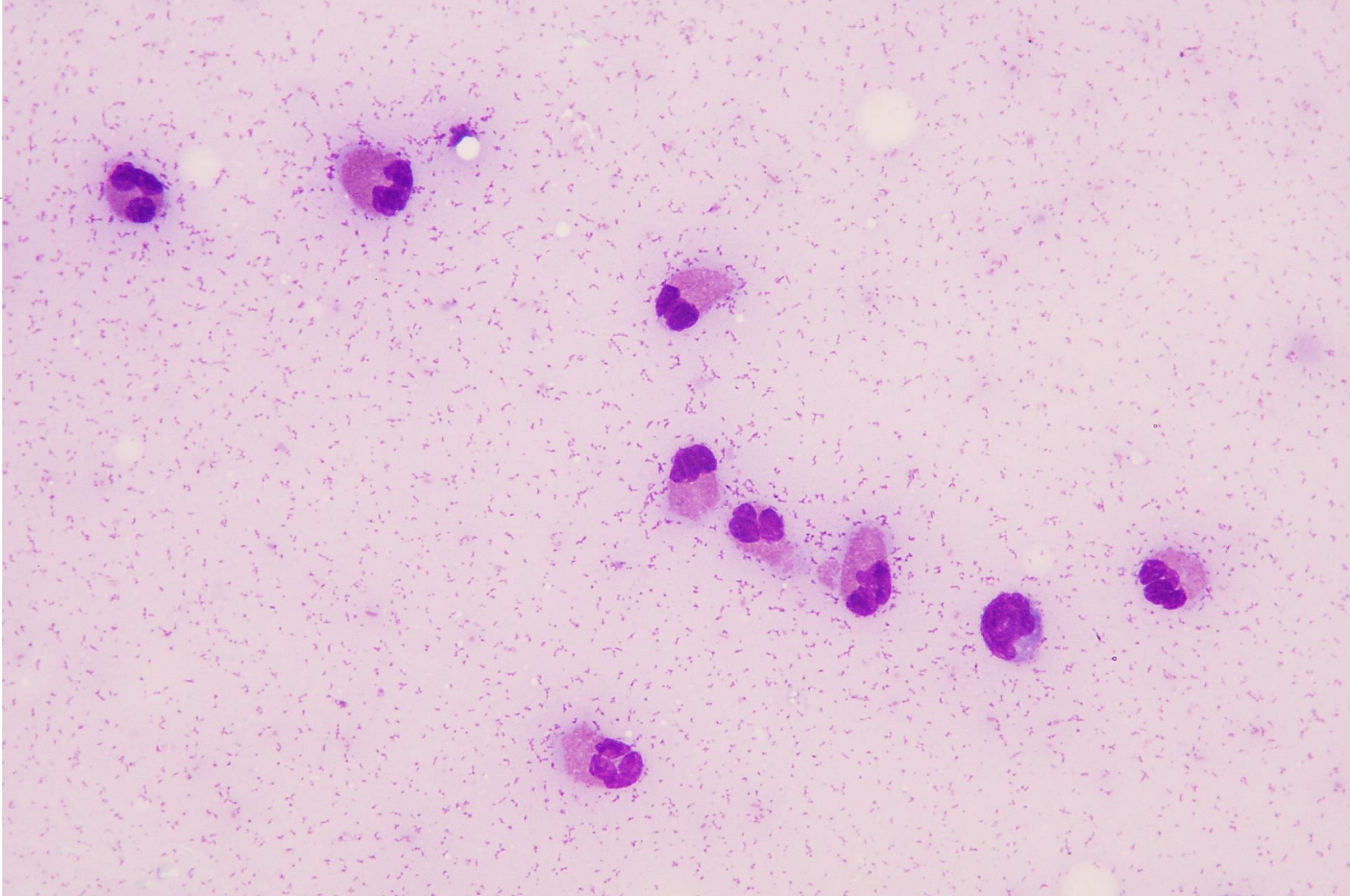




Case #9

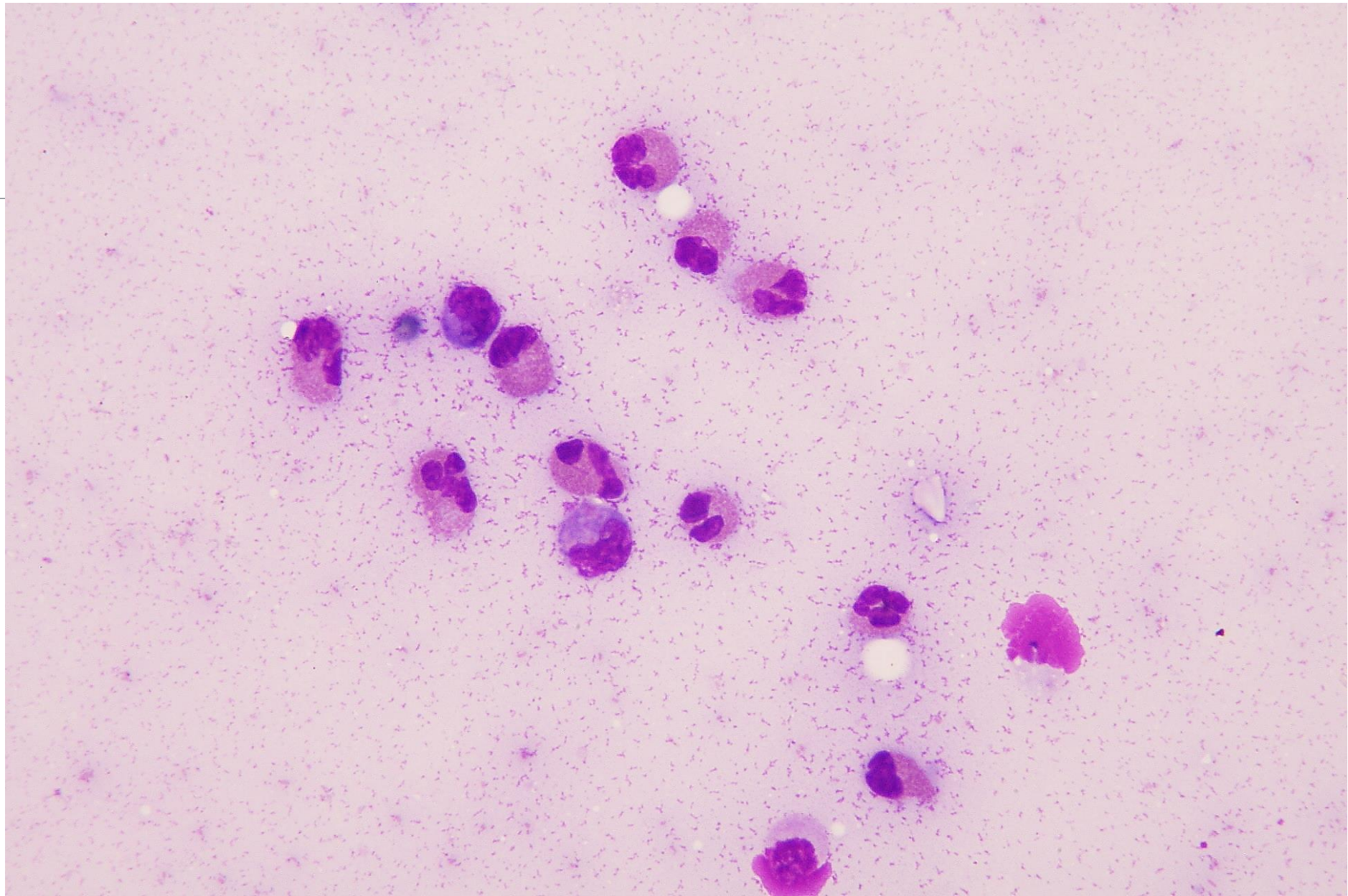
- Cat, DSH, 11 years-old, male
- Lameness in right foreleg
- Swelling of the carpal joint
- Mild lymphadenomegaly of prescapular lymphnode
- Flushing of the joint fluid
 - Direct smear
 - MGG stain
- FNCS of lymph node





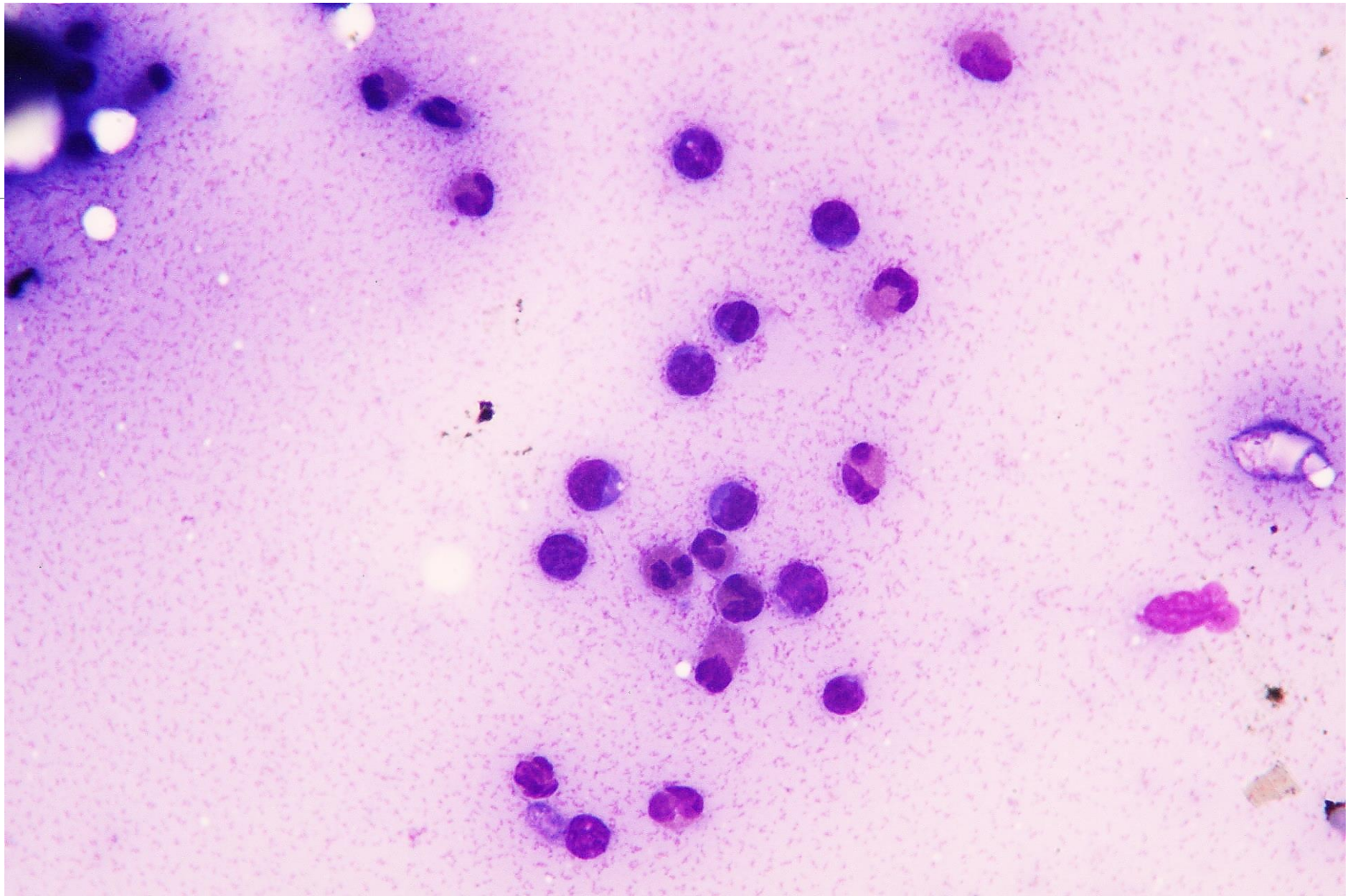
IDEXX International Education

IDEXX
LABORATORIES



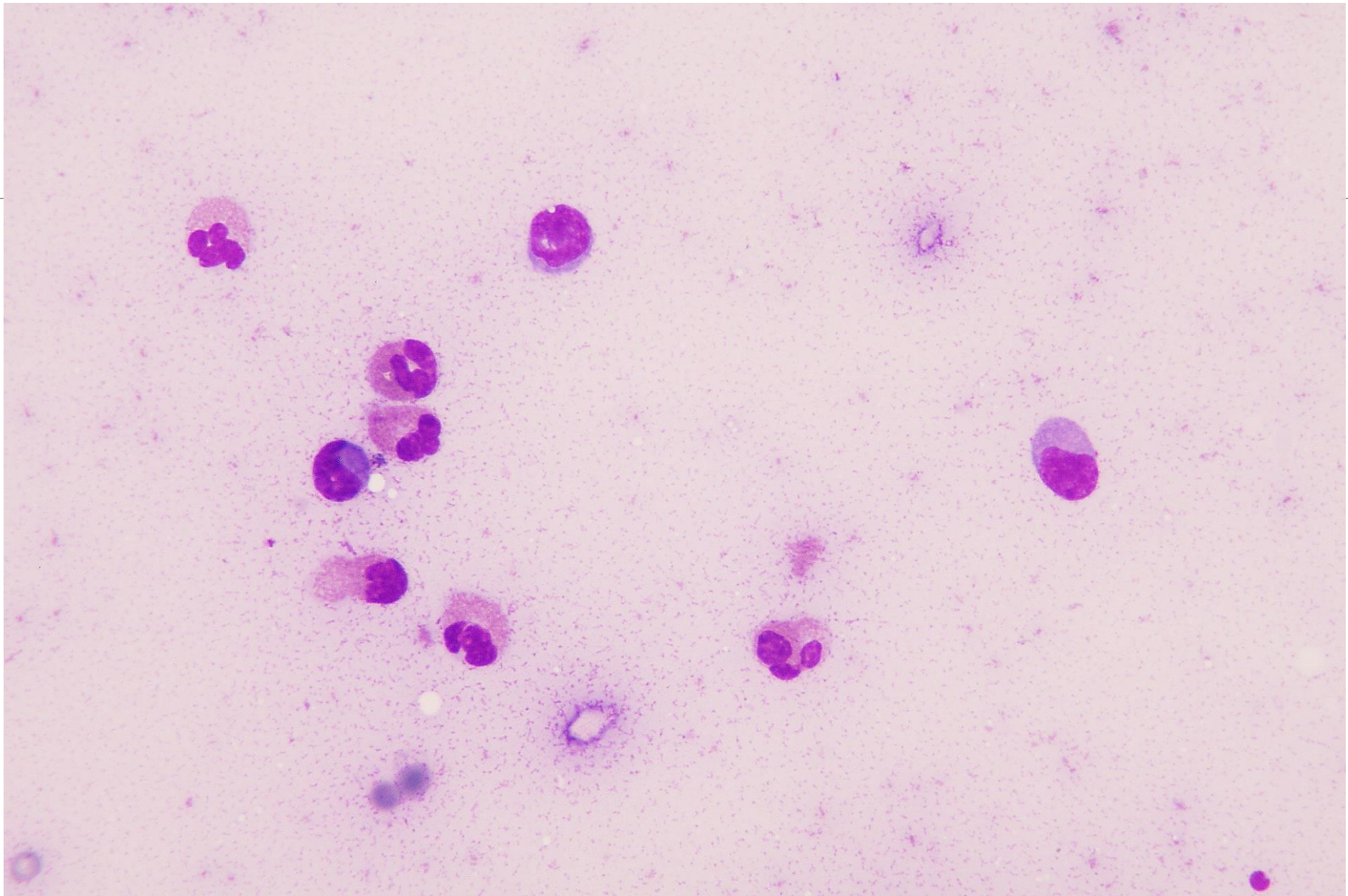
IDEXX International Education

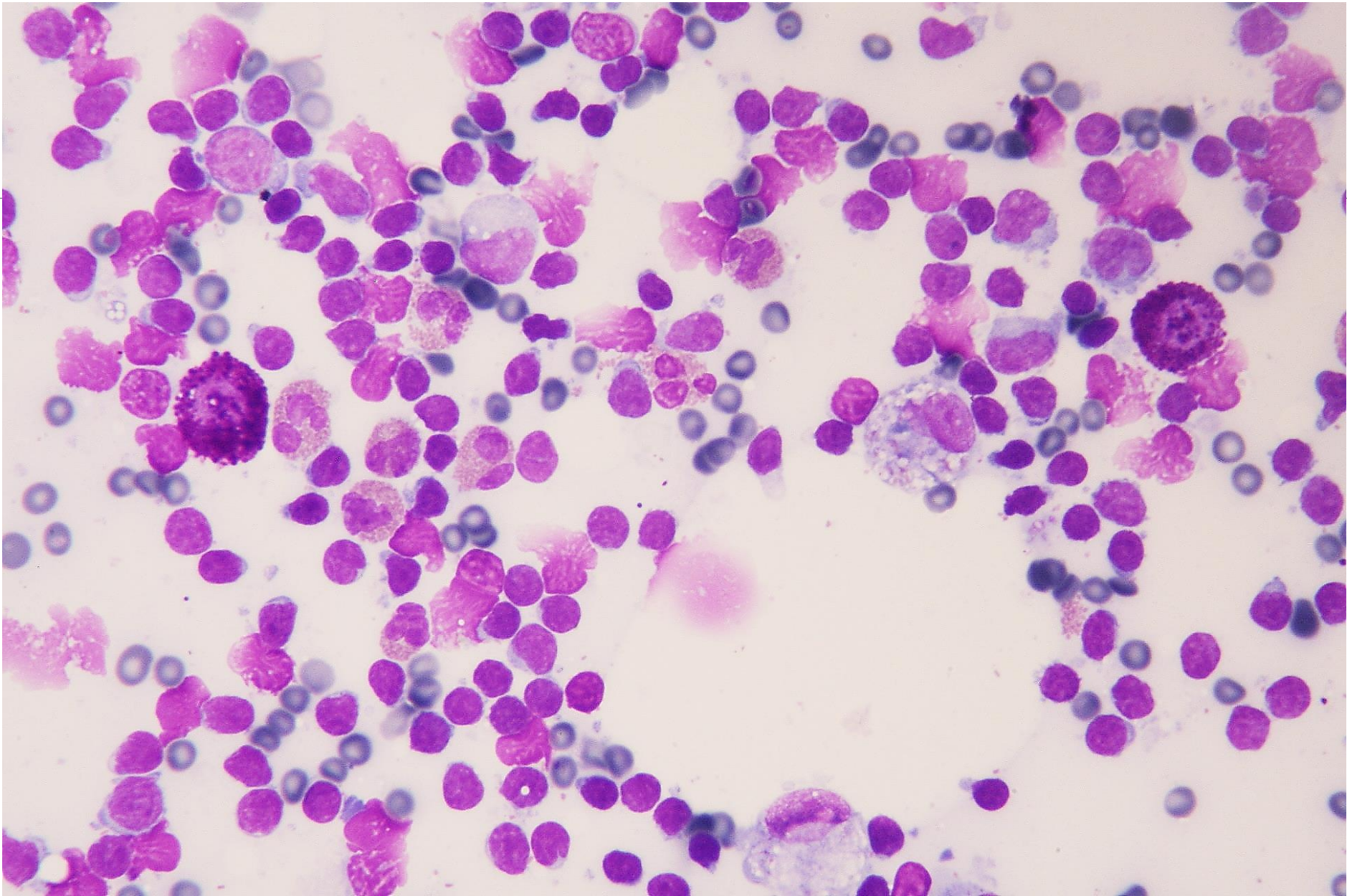
IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES





IDEXX International Education

IDEXX
LABORATORIES

Cytologic findings

- Synovial fluid:
 - Inflammatory cells
 - Prevalence of eosinophils
 - Some mononucleated cells
 - Macrophages
 - Rare lymphocytes
- Lymph node
 - Polymorphic lymphocytes
 - Many eosinophils
 - Rare mast cells



Cytologic diagnosis

- Eosinophilic arthritis
- Eosinophilic lymphadenitis



Silverstein DC, Almy FS, Zinkl JG, Christopher MM. Idiopathic localized eosinophilic synovitis in a cat. Vet Clin Pathol. 2000;29(3):90-92.

- A 4-year-old male castrated Seal Point Himalayan cat
 - Right thoracic limb lameness of 6 weeks duration.
 - Synovial fluid analysis
- Mixed cell synovitis, with a total nucleated cell count of 13,200/microliter and 34% eosinophils.
- A diagnosis of idiopathic localized eosinophilic arthritis was made.
 - Mild lymphadenopathy with lymphoid hyperplasia
 - Antinuclear antibody titer of 1:320.
- Eosinophilic synovitis has not previously been reported in cats.
- An immune-mediated mechanism was likely in this case; however, the exact etiology remains unknown.



- Climent F, Carmona JU, Cuenca R, Prades M. **Eosinophilic synovitis of the tarsocrural joint in a horse.** Vet Comp Orthop Traumatol. 2007;20(2):142-5.
- Madison JB, Ziemer EL. **Eosinophilic synovitis following the intra-articular injection of bacterial antigen in horses.** Res Vet Sci. 1993 Mar;54(2):256-8.
- Turner AS, Gustafson SB, Zeidner NS, McIlwraith CW, Thrall MA. **Acute eosinophilic synovitis in a horse.** Equine Vet J. 1990 May;22(3):215-7.



EOSINOPHILIC SYNOVITIS

Sir,

I refer to the article in the July 1995 issue entitled 'Eosinophilic synovitis: a new entity?' by Tauro (1995;77-B:654-6).

Eosinophilic synovitis is not a new condition since there have been several previous reports on synovial fluid eosinophilia and eosinophilic infiltration of the synovium after arthrography (Hasselbacher and Schumacher 1978), in metastatic carcinoma of the synovium (Goldenberg, Kelley and Gibbons 1975), in guinea-worm joint infestation (Reddy, Parvathi and Sivaramappa 1969), after irradiation (Hasselbacher and Schumacher 1977), in atopy (Al-Dabbagh and Al-Irhayim 1983), in hypereosinophilic syndrome (Brogadir, Goldwein and Schumacher 1980), and in HLA B27-related arthropathy (Bissonnette and Beaudet 1983).

Dr Tauro's report adds another description in which the condition may be parasitic-related. It is important, however, that 'eosinophilic synovitis' should not be regarded as a specific condition, but as a descriptive term to describe an enigmatic synovial pathology which may be encountered in diverse clinical circumstances.

B. VERNON-ROBERTS, MD, PhD, FRCPath, FRCPA
University of Adelaide
Adelaide, South Australia.

Al-Dabbagh AI, Al-Irhayim B. Eosinophilic transient synovitis. *Ann Rheum Dis* 1983;42:462-5.

Bissonnette B, Beaudet F. Reactive arthritis with eosinophilic synovial infiltration. *Ann Rheum Dis* 1983;42:466-8.

Brogadir SP, Goldwein MI, Schumacher HR. A hypereosinophilic syndrome mimicking rheumatoid arthritis. *Am J Med* 1980;69:799-802.

THE JOURNAL OF BONE AND JOINT SURGERY

Goldenberg DL, Kelley WL, Gibbons RB. Metastatic adenocarcinoma of synovium presenting as an acute arthritis. *Arthr Rheum* 1975; 18:107-10.

Hasselbacher P, Schumacher HR. Bilateral protrusio acetabuli following pelvic irradiation. *J Rheumatol* 1977;4:189-96.

Hasselbacher P, Schumacher HR. Synovial fluid eosinophilia following arthrography. *J Rheumatol* 1978;5:173-6.

Reddy CR, Parvathi G, Sivaramappa M. Adhesion of white blood cells to guinea worm larvae. *Am J Trop Med Hyg* 1969;18:378-81.

Tauro B. Eosinophilic synovitis: a new entity? *J Bone Joint Surg [Br]* 1995; 77-B:654-6.



Case #10

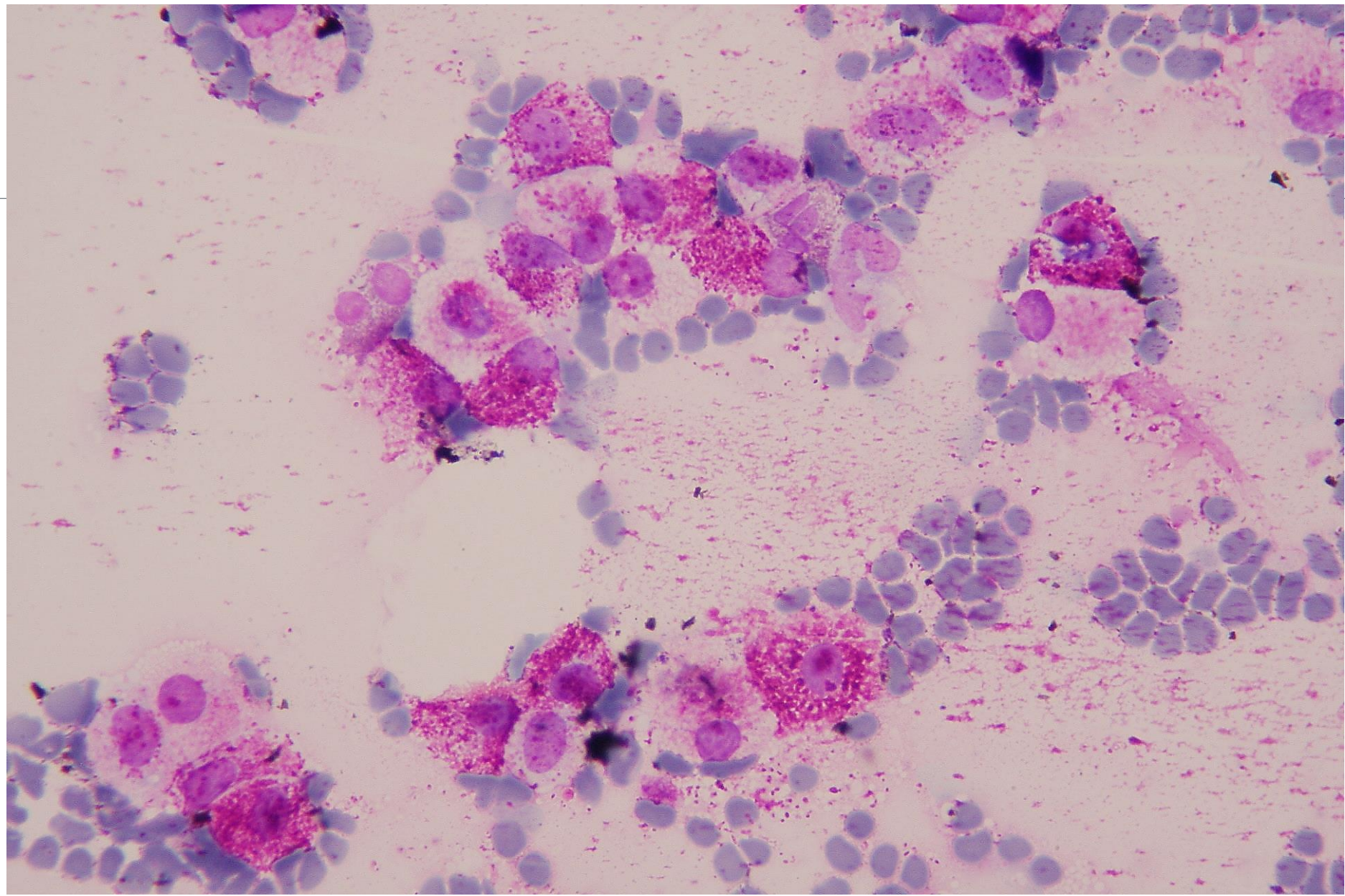
- Cat, DSH, 10-years-old, female
- Anorexia
- Sporadic vomiting
- Ultrasound examination revealed:
 - Thickening of gastric wall
 - Mild hepatomegaly
 - FNCS
 - MGG stain



Cytologic findings

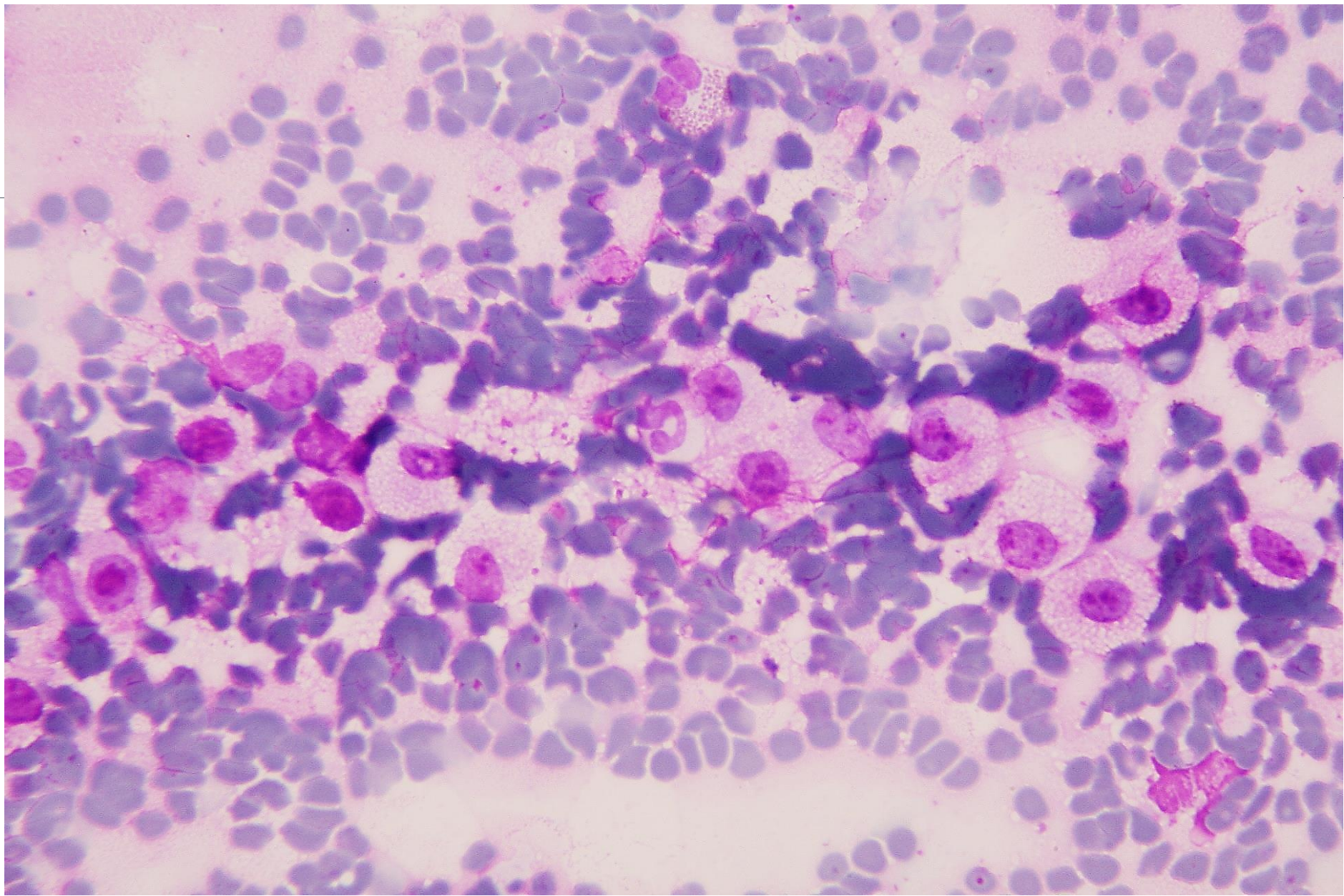
- Gastric wall:
- Poor quality
- Scattered round cells
 - Cytoplasmic microglobules
 - Cytoplasmic granules
- Liver:
 - Cells with the same features
 - Single or in small aggregates





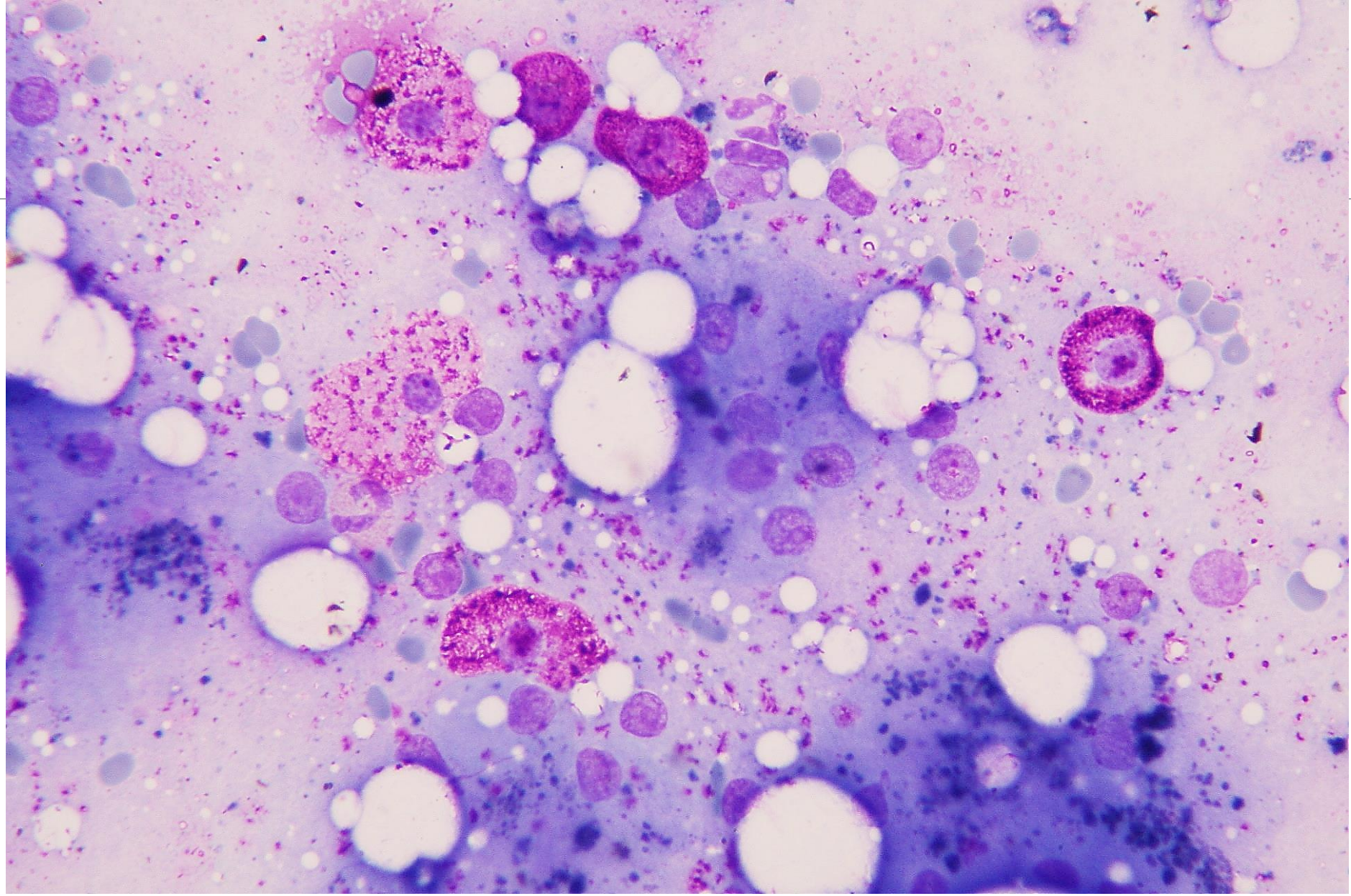
IDEXX International Education

IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES



IDEXX International Education

IDEXX
LABORATORIES

Cytologic diagnosis

- Gastric mast cell tumor
- Metastasis to the liver (systemic involvement?)



Feline gastrointestinal mast cell tumors

- MCT is the third most common gastrointestinal neoplasm (Rissetto, 2011)
- Approx. 5% of tumors at this site
- Cytoplasmic granules can be difficult to be recognized
 - Mucosal origin of the mast cells
 - Immature granules with reduced concentration of histamine or heparin
- Eosinophils in low number within the tumor
- Circulating mast cell or eosinophilia are rare



Feline gastrointestinal mast cell tumors

- In the present case hepatic involvement is unusual
- Not investigated if:
 - Hepatic metastasis
 - Systemic involvement (mastocytosis)

