

BOVINE INTESTINAL PATHOLOGY

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Contributors

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- Plum Island foreign animal disease diagnostic and research station

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Bovine intestinal infectious agents viruses

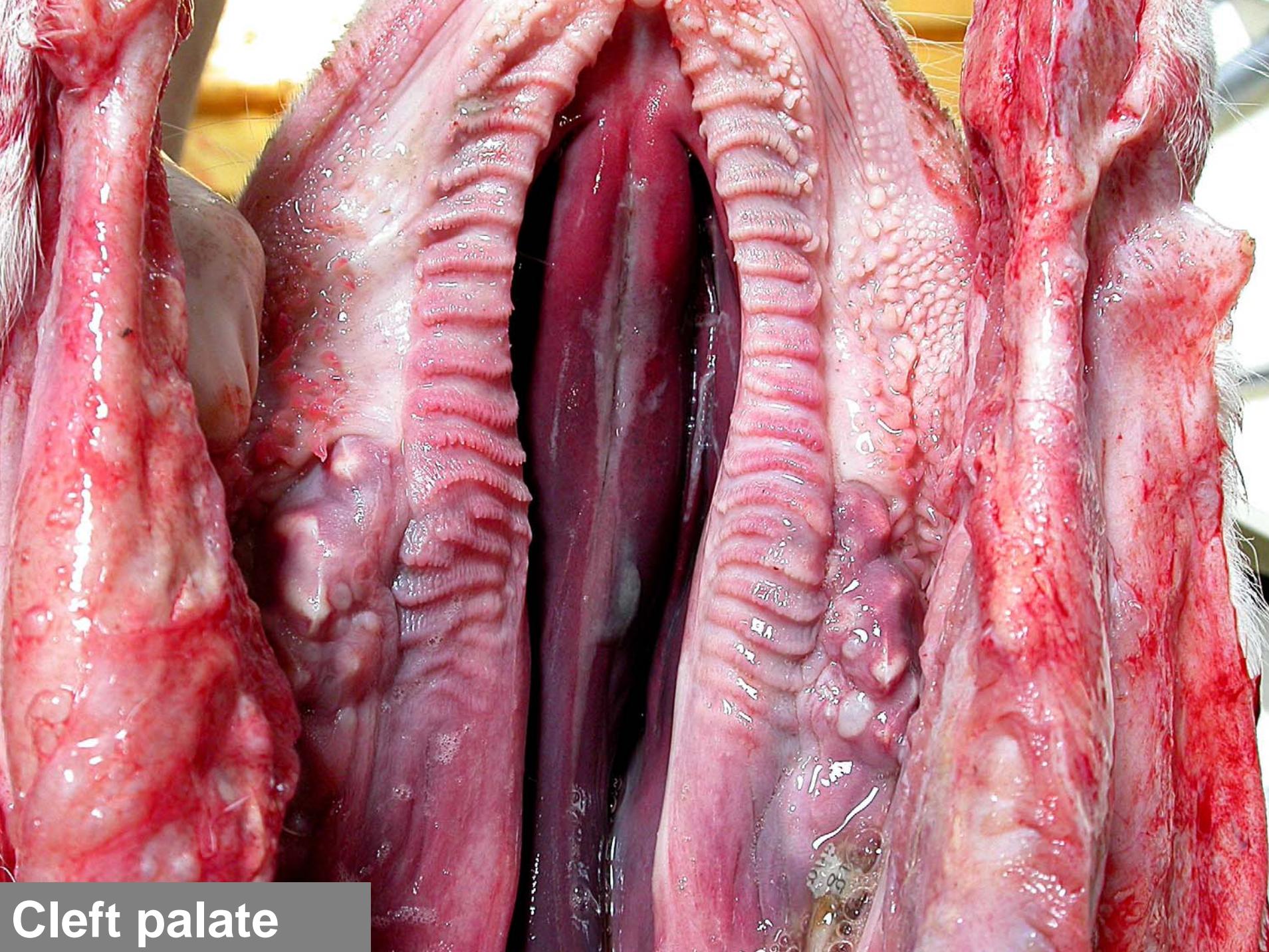
- Rotavirus
- Coronavirus
- Bovine pestivirus (BVDV)
- Parvovirus
- Bovine herpesvirus 1 (BHV-1)
- Rinderpest morbillivirus
- Malignant catarrhal fever herpesviruses

Bovine intestinal infectious agents bacteria, protozoa, fungi, parasites

- *Escherichia coli*
- *Salmonella* spp.
- *Clostridium* spp.
- *Sarcina* spp.
- *Mycobacterium avium*
paratuberculosis
- *Mycobacterium bovis*

Bovine intestinal infectious agents bacteria, protozoa, fungi, parasites

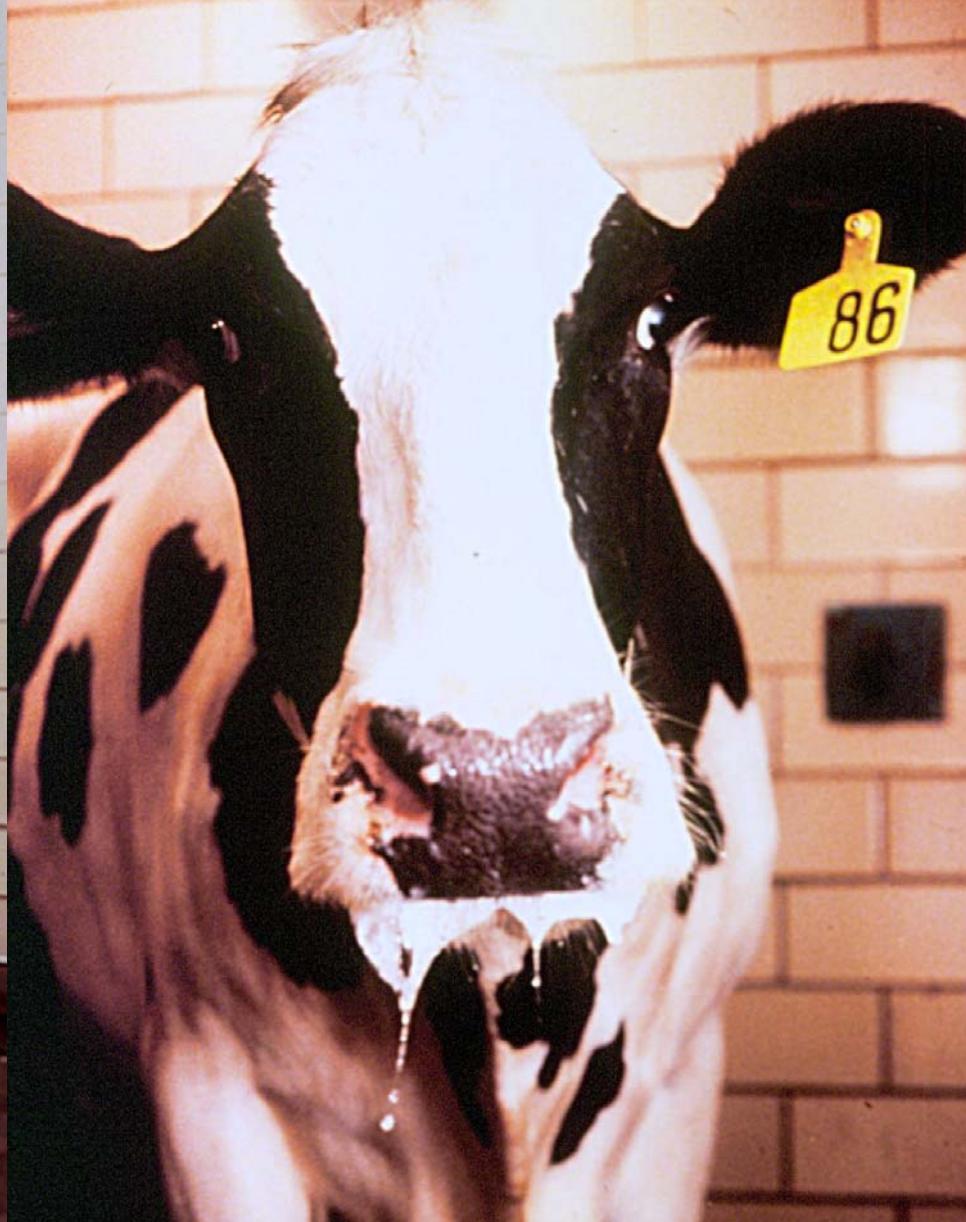
- *Eimeria bovis* and *zurnii*
- *Cryptosporidium* spp.
- Yeasts (*Candida* spp.)
- Fungi (*Aspergillus* spp., Zygomycetes)
- Nematodes and tapeworms



Cleft palate



Papular stomatitis



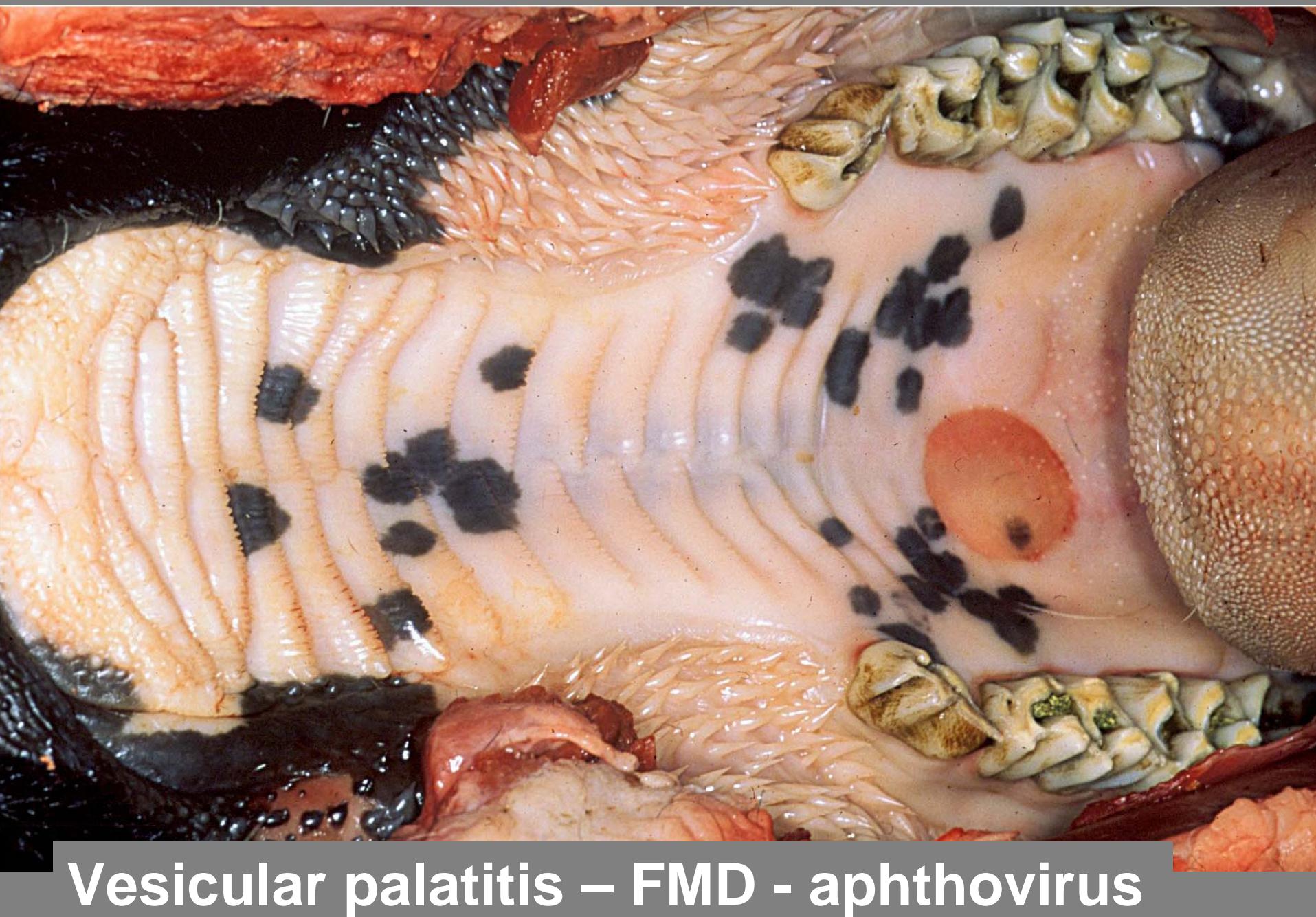
**Vesicular stomatitis with sialorrhea – FMD –
aphthovirus**



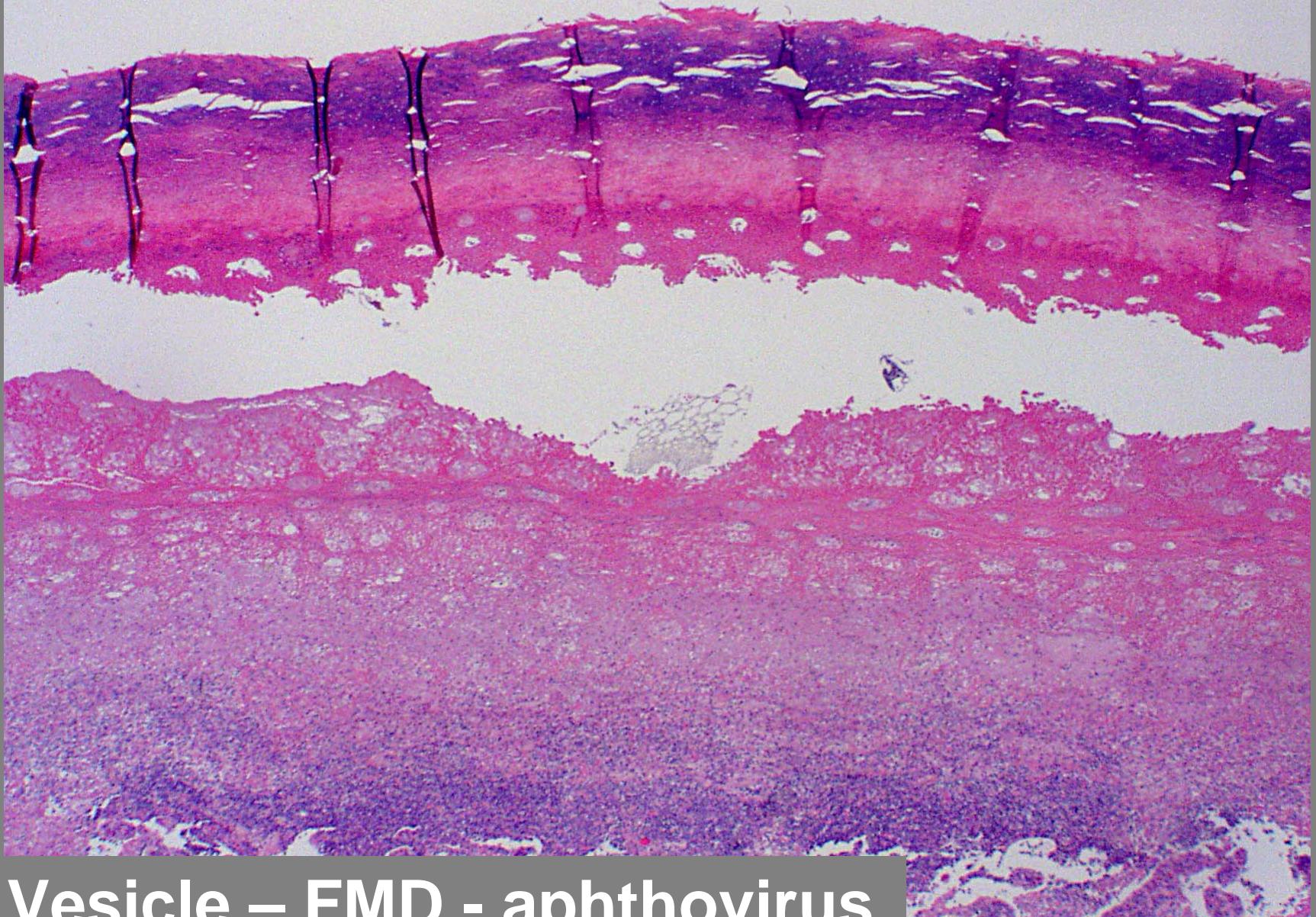
Vesicular glossitis – FMD - aphthovirus



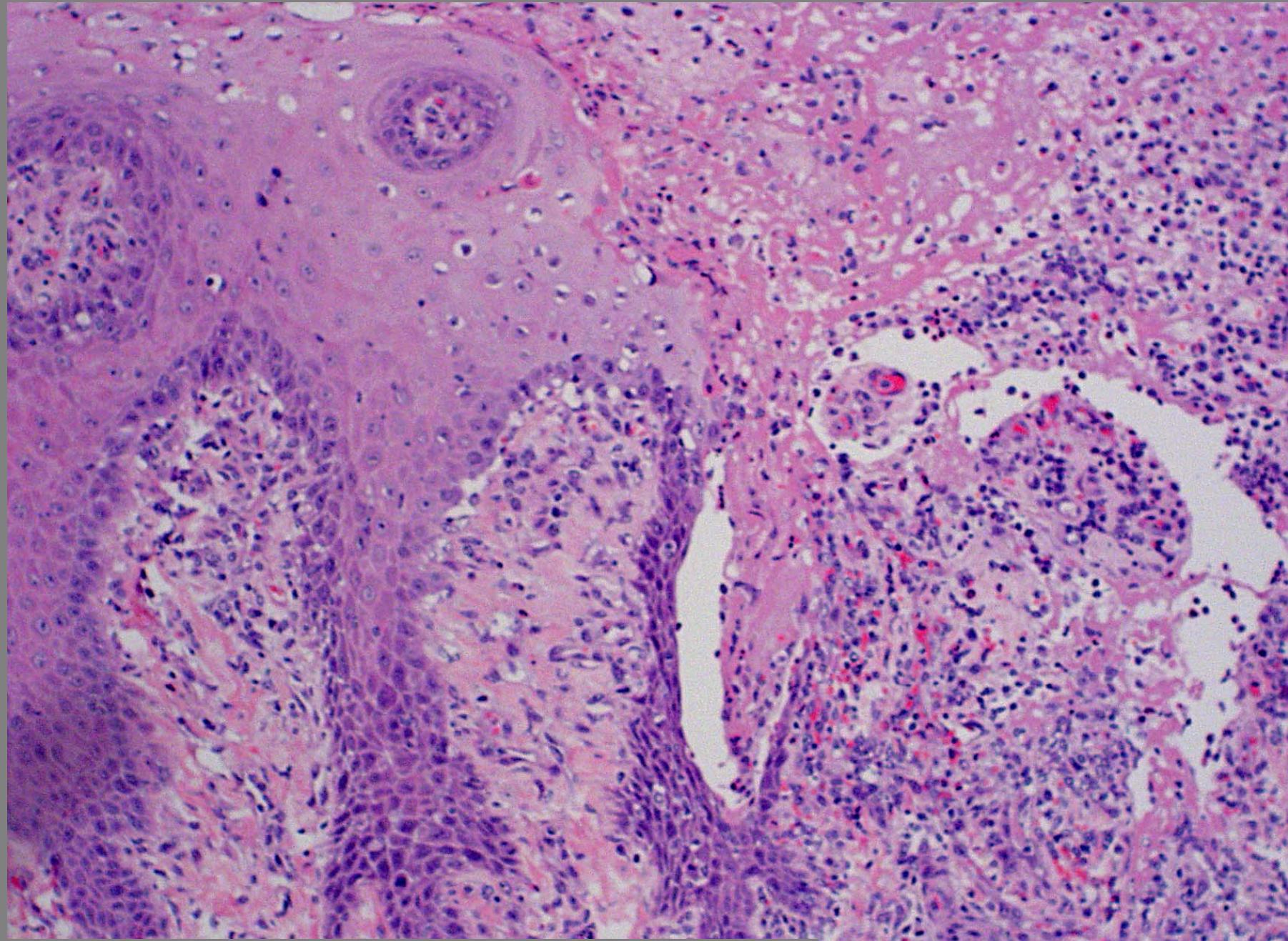
**Vesicular glossitis - ruptured large vesicle
FMD - aphthovirus**



Vesicular palatitis – FMD - aphthovirus



Vesicle – FMD - aphthovirus



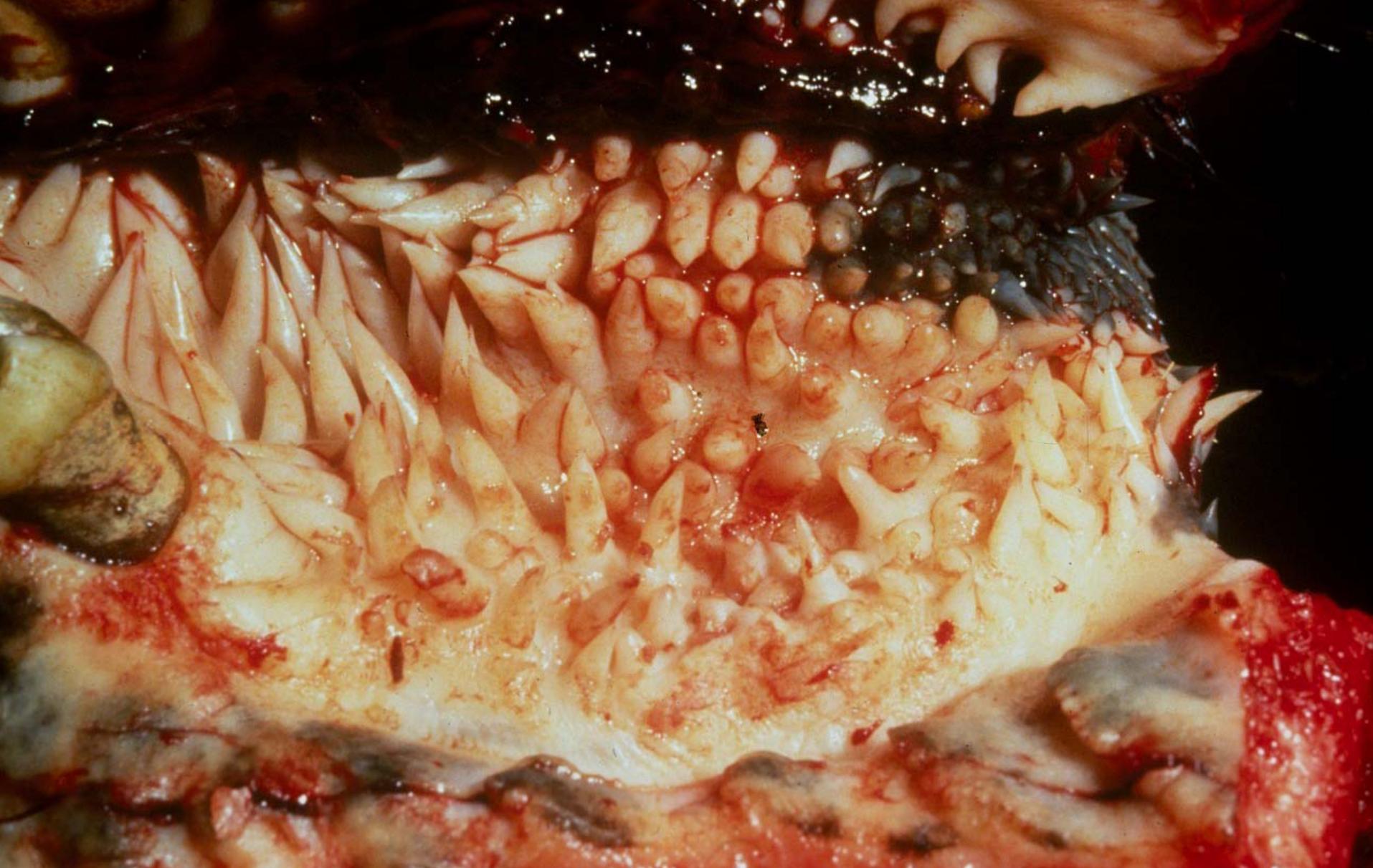
Vesicle – FMD - aphthovirus



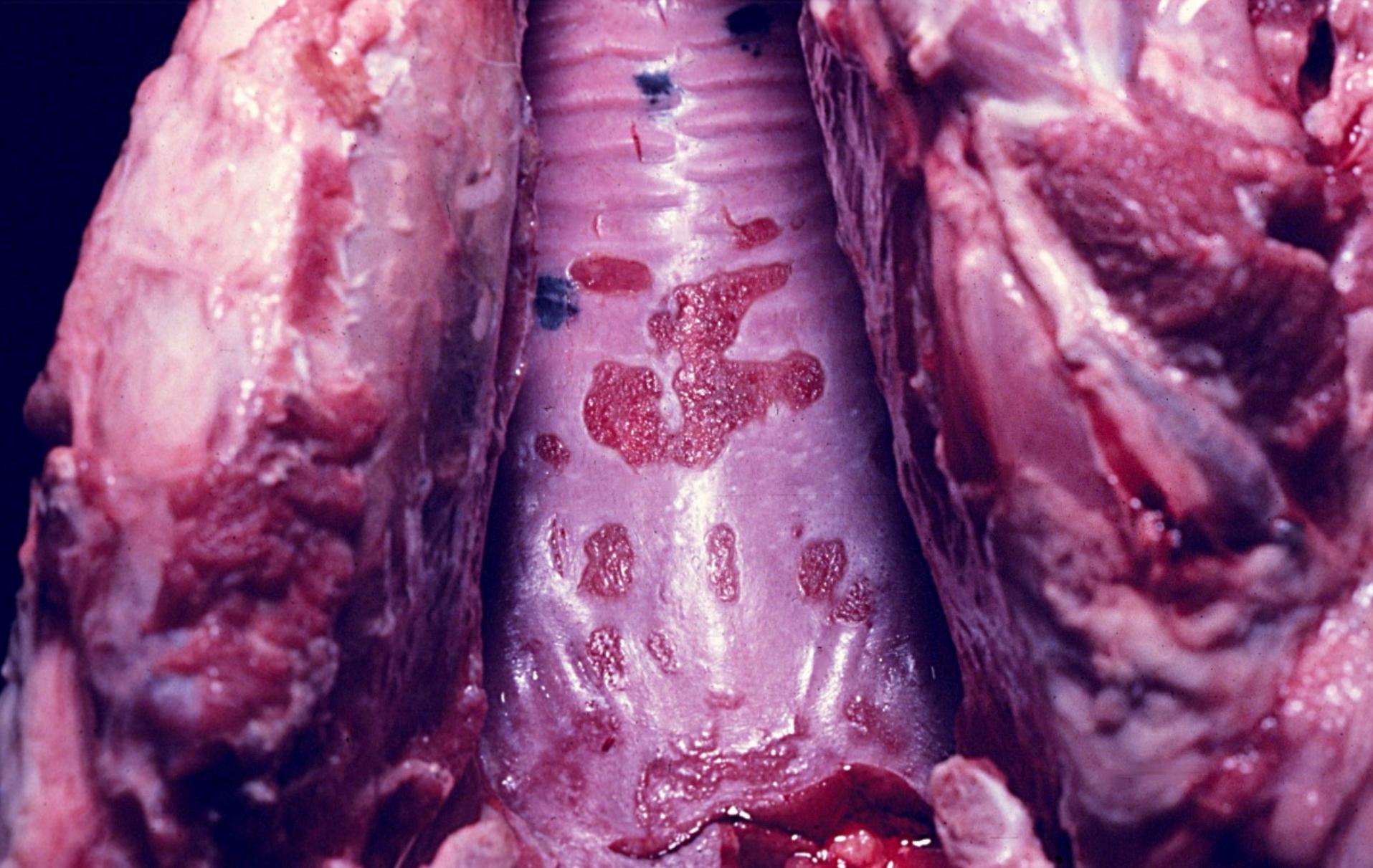
**Vesicular, erosive, ulcerative ruminitis
– FMD - aphthovirus**



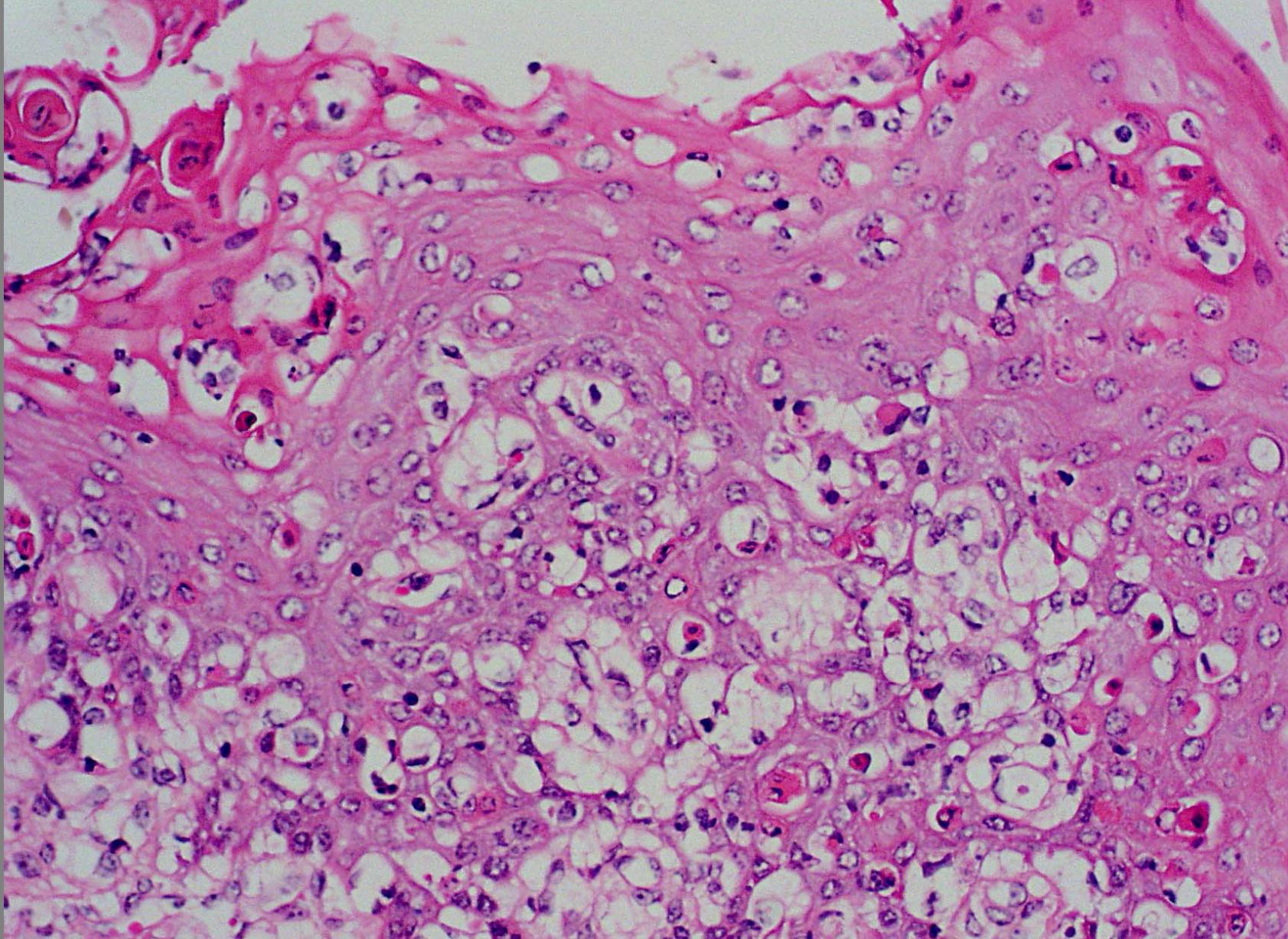
**Erosive ulcerative cheilitis and stomatitis
– BVD mucosal disease BV pestivirus**



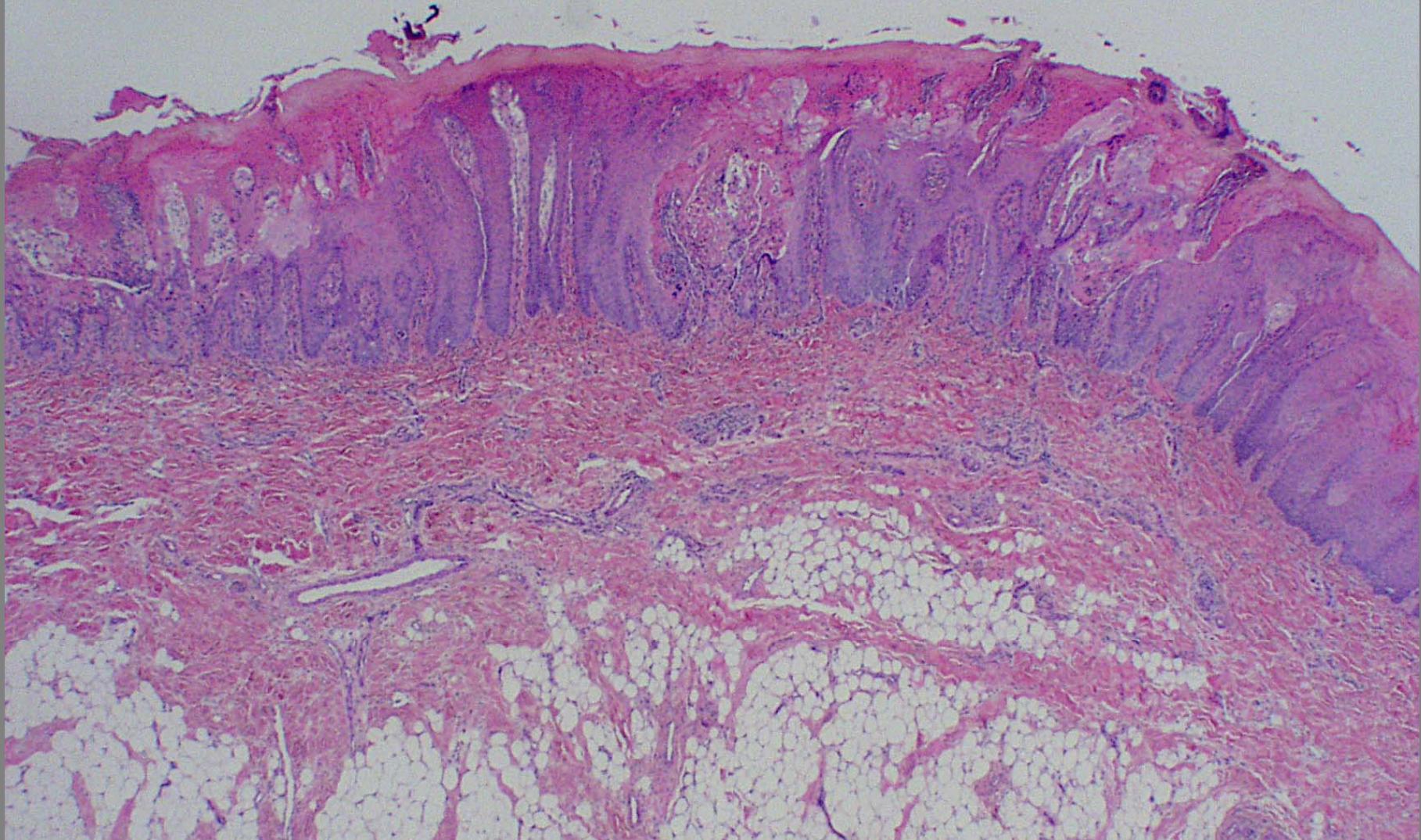
Erosive ulcerative vestibular papillary
stomatitis – BVDV pestivirus



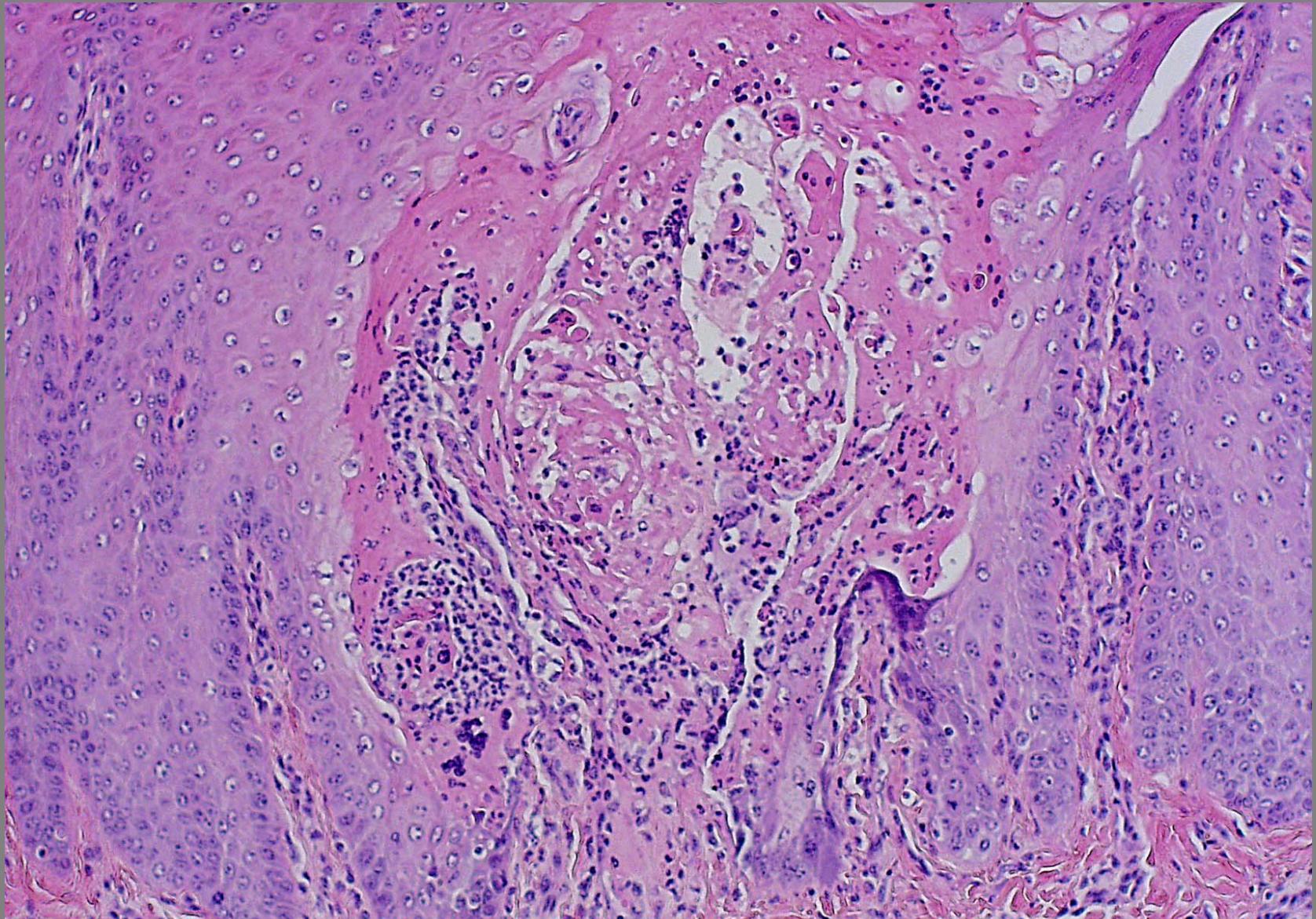
Erosive ulcerative palatine stomatitis – BVDV
pestivirus



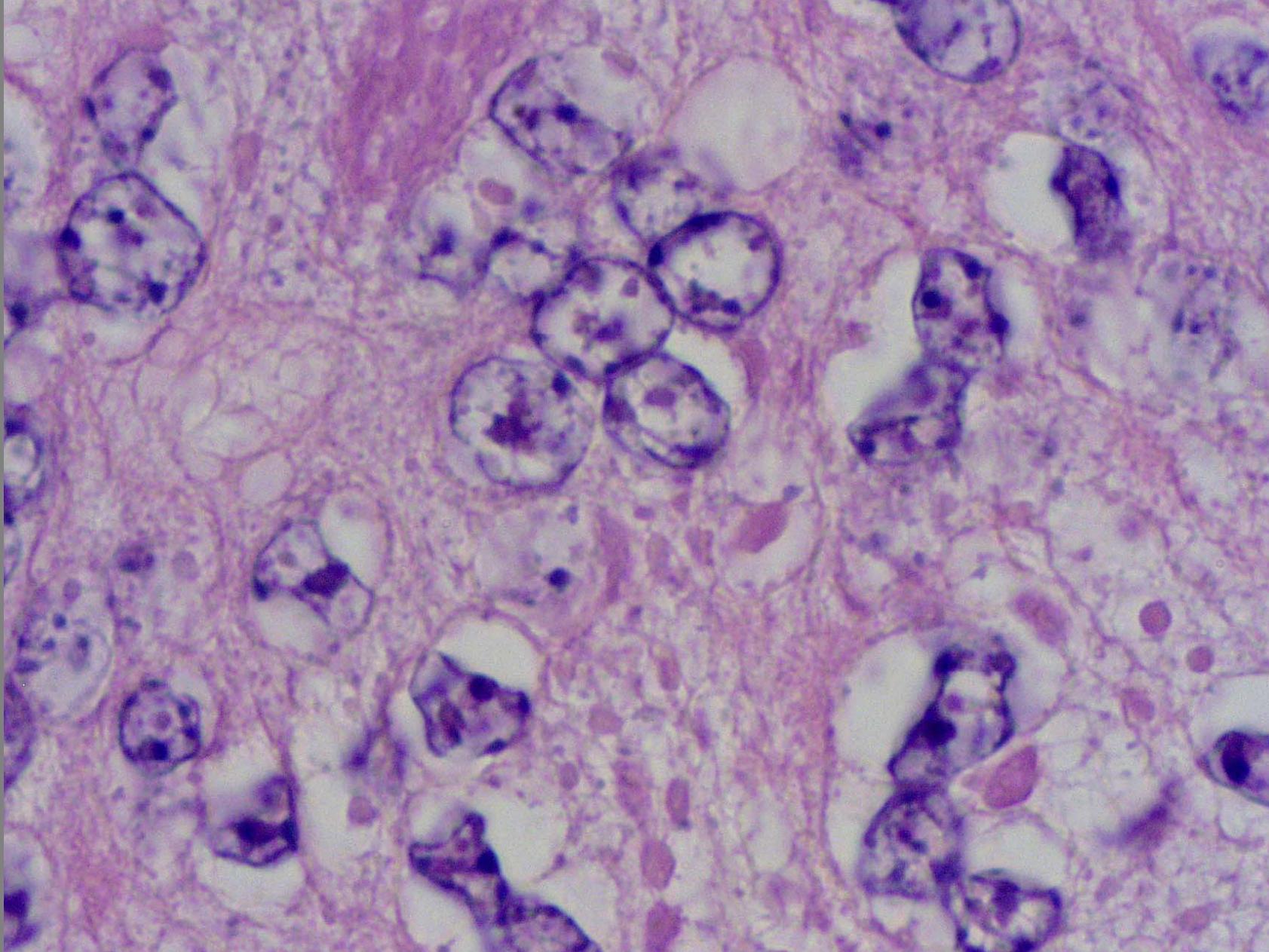
Erosive stomatitis – single cell death – cytopathic effect – BVDV pestivirus



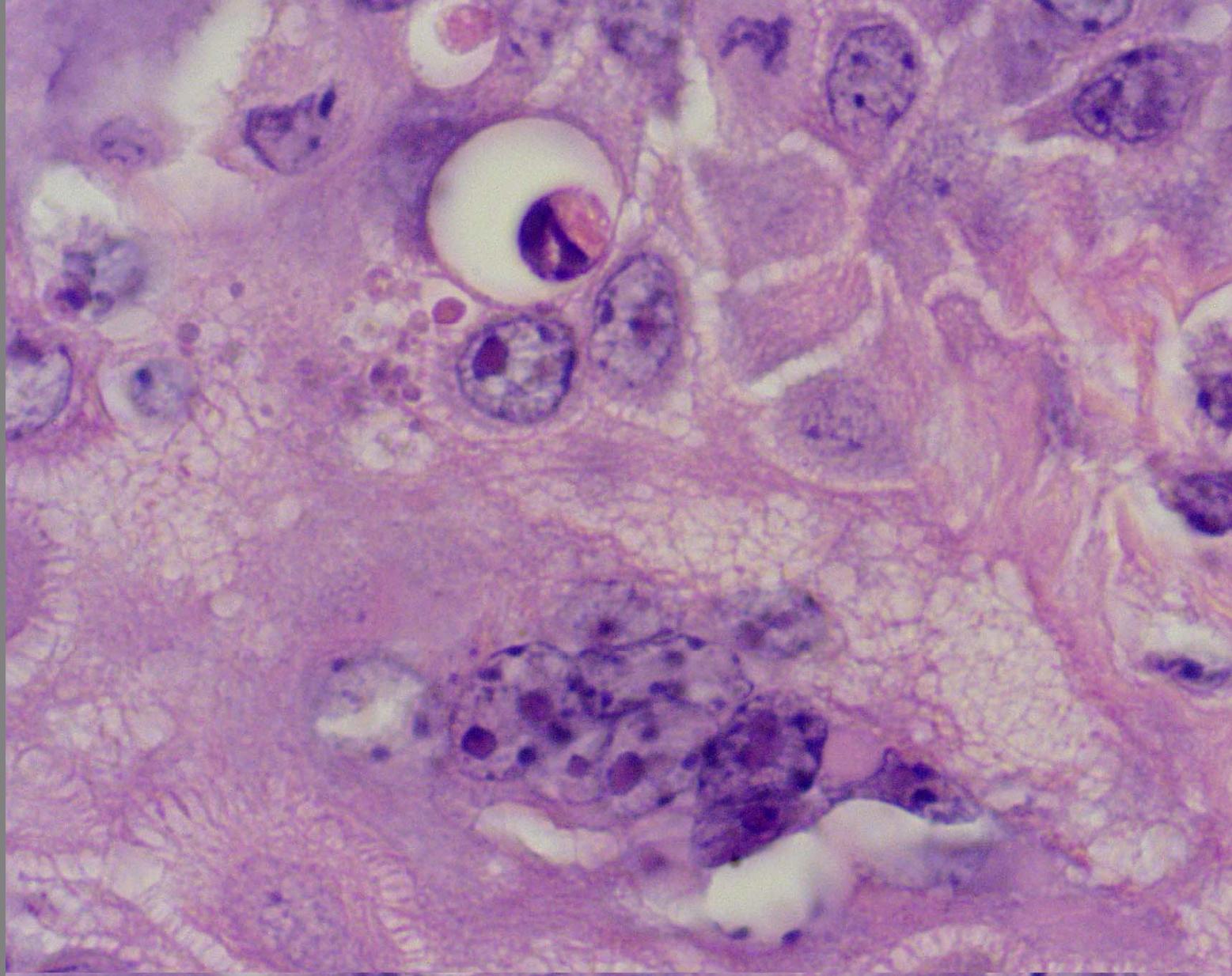
**Erosive ulcerative necrotizing glossitis
Rinderpest morbillivirus**



Erosive ulcerative necrotizing glossitis
Rinderpest morbillivirus



Oral epithelium – syncytium – and viral inclusions -
Rinderpest morbillivirus



Oral epithelium – syncytium and single cell necrosis -
Rinderpest morbillivirus



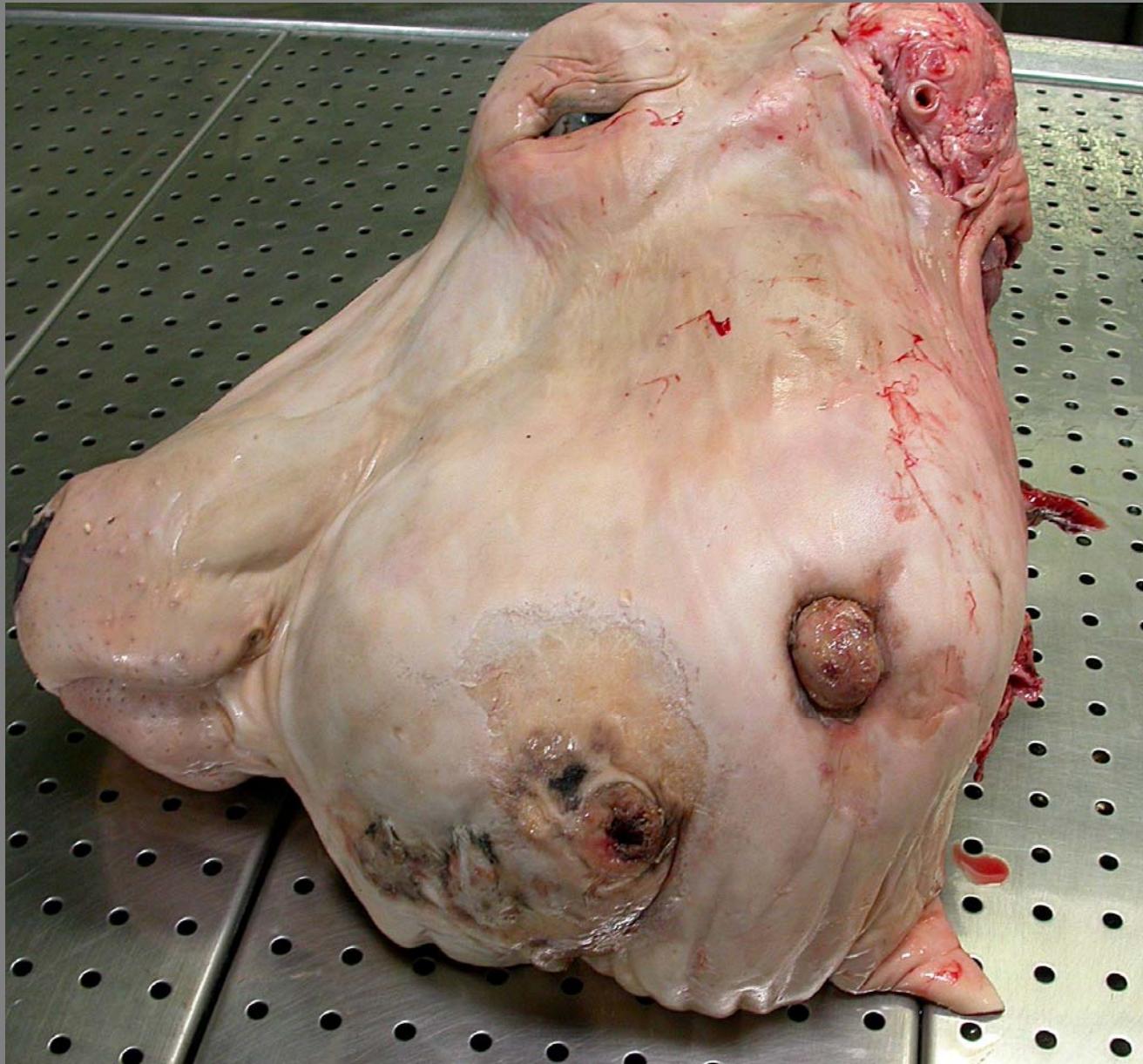
Fawn – gangrenous stomatitis periodontitis and
osteomyelitis – *Fusobacterium necrophorum*



Lingual fossa ulcer – trauma and *Actinobacillus lignieresii*



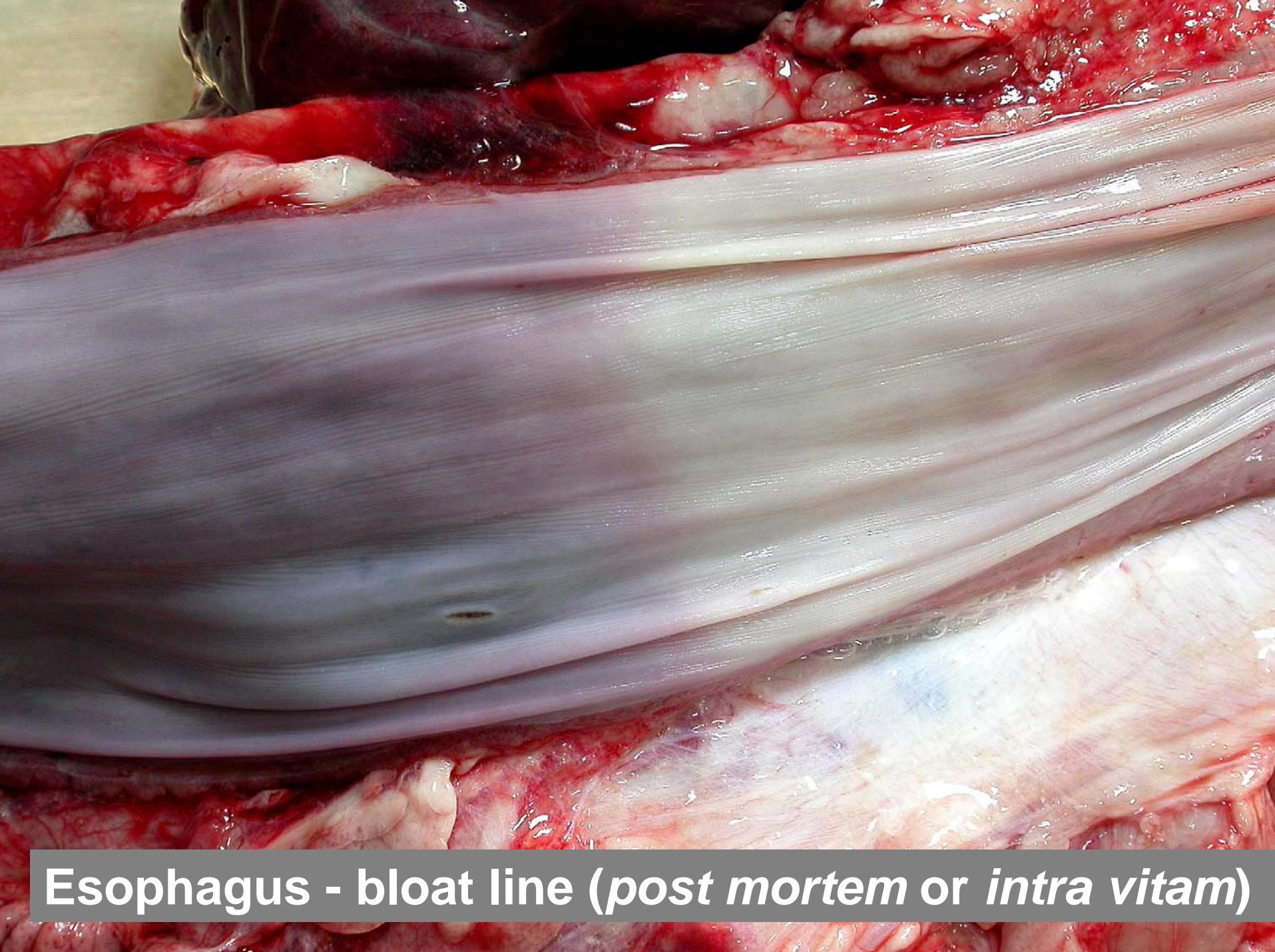
Glossitis, pyogranulomatous - *Actinobacillus lignieresii*
Courtesy of John Edwards and John M. King



Jaw – Osteomyelitis pyogranulomatous, chronic, fibrosing,
rarefacting – *Actinomyces bovis*



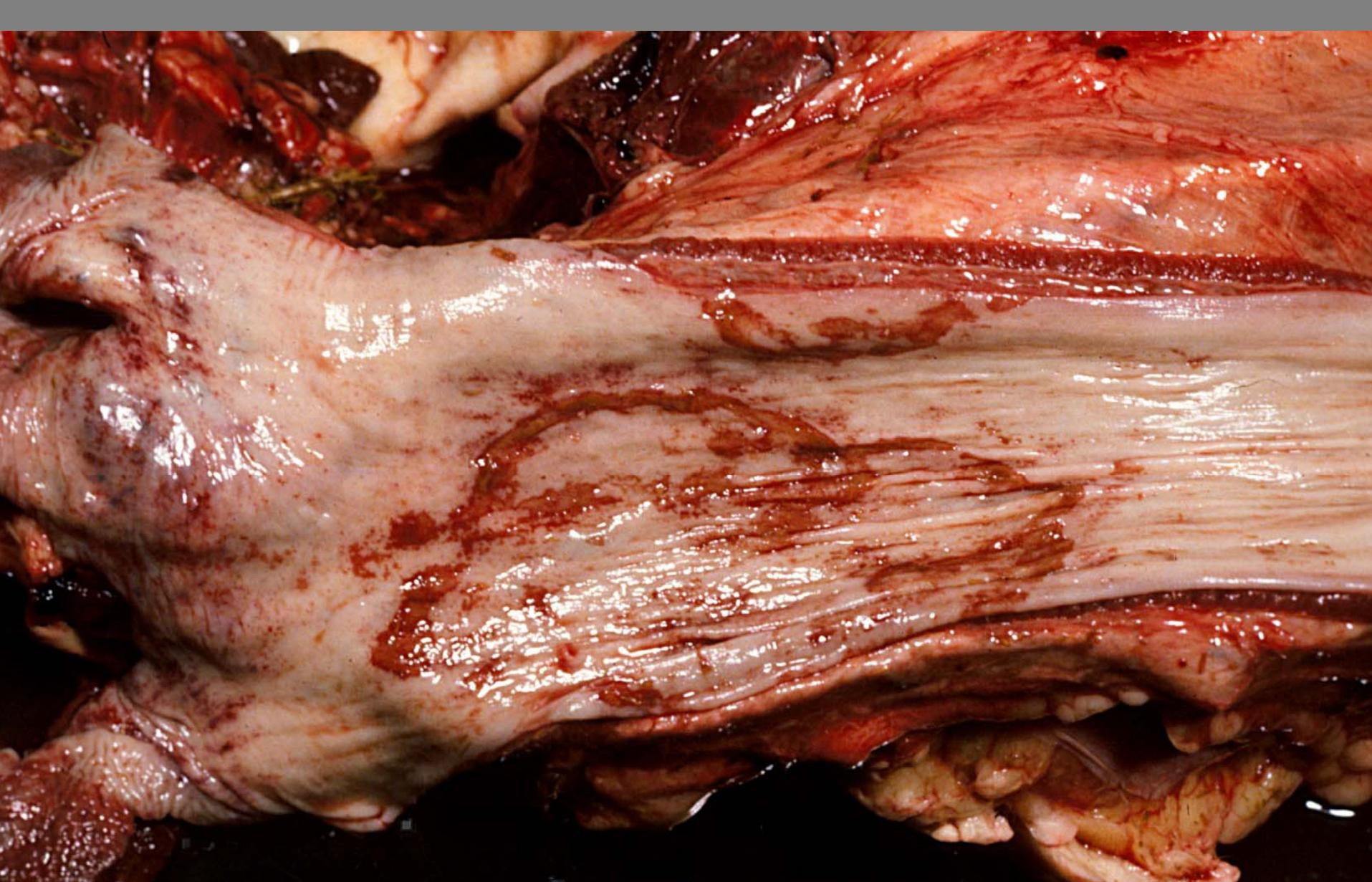
Jaw – Osteomyelitis pyogranulomatous, chronic, fibrosing,
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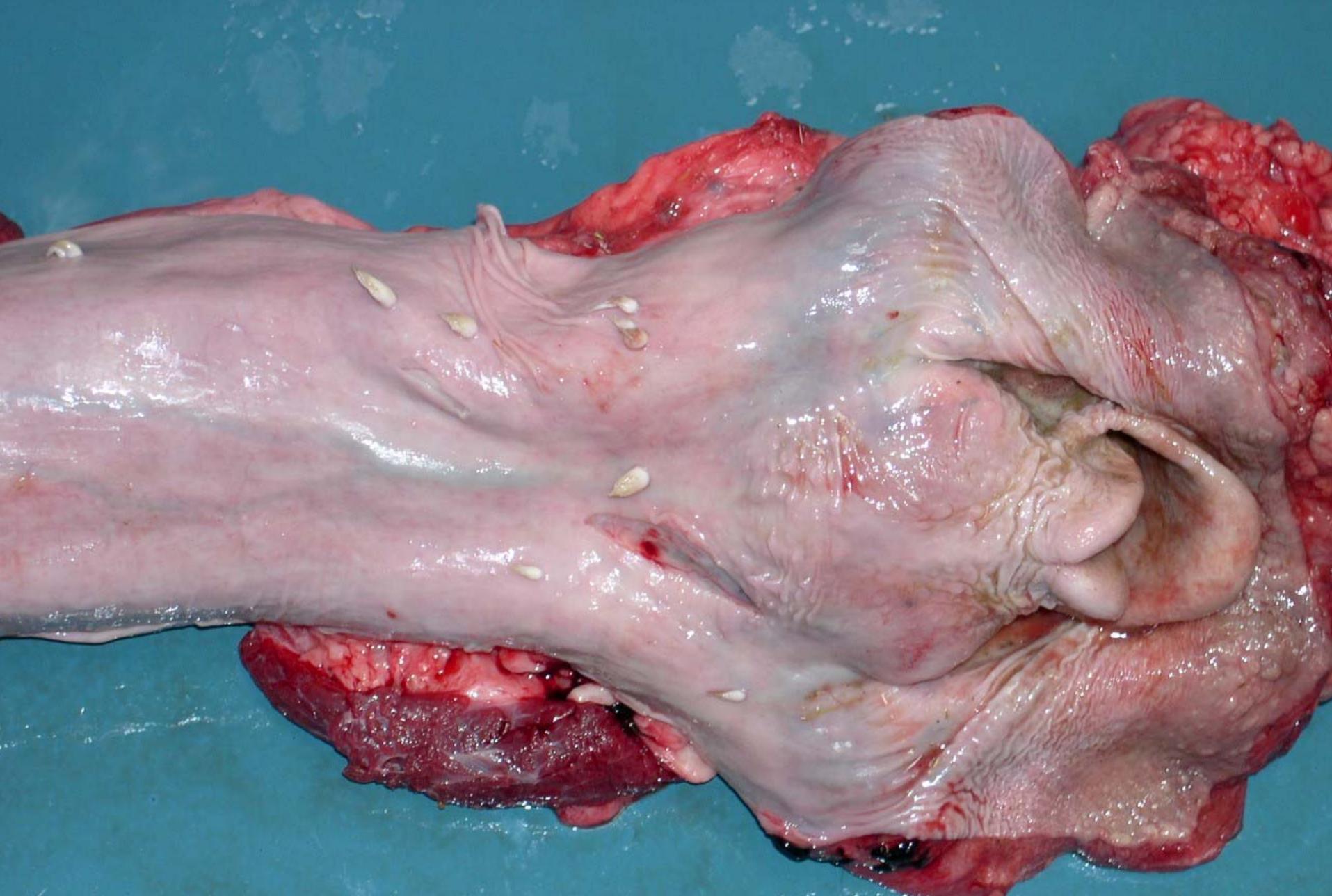
Esophagus - bloat line (*post mortem* or *intra vitam*)



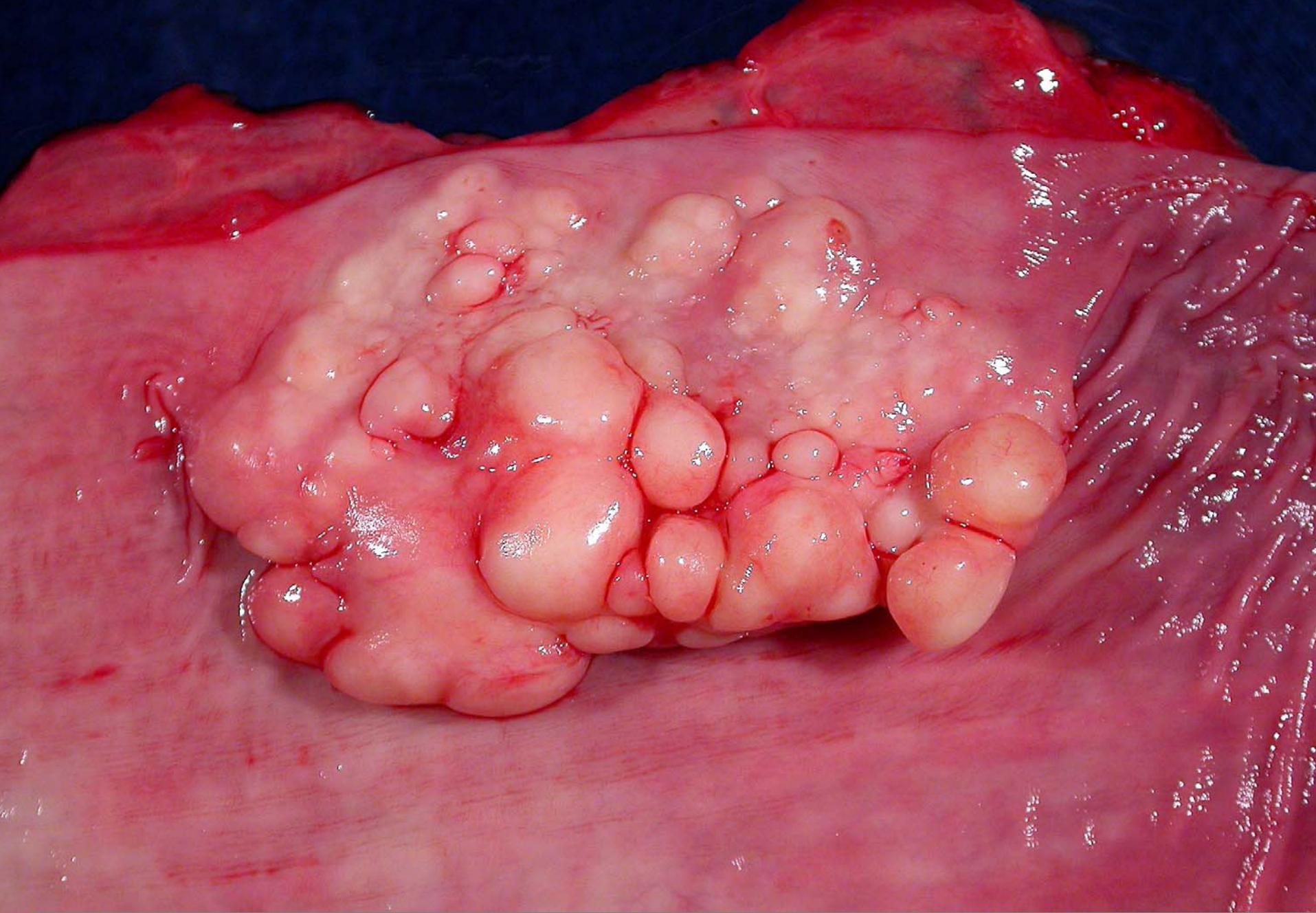
**Esophagus – erosive, ulcerative esophagitis – BVD
pestivirus**



**Esophagus – erosive, ulcerative esophagitis – MCF
herpesvirus**



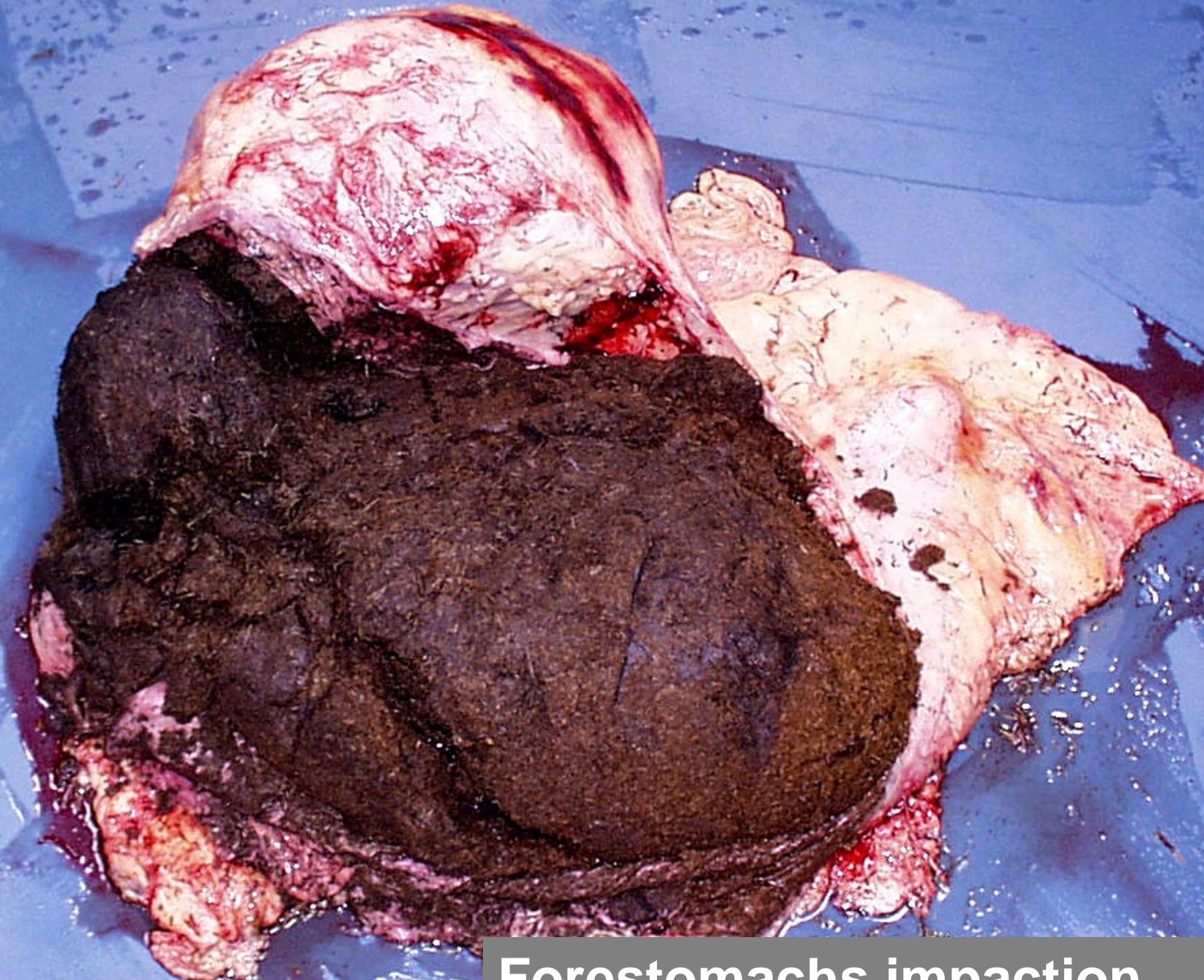
Esophagus – papillomata – BV papillomavirus



Esophagus – fibropapilloma – BV papillomavirus



Esophagus – *Gongylonema pulchrum*



Forestomachs impaction



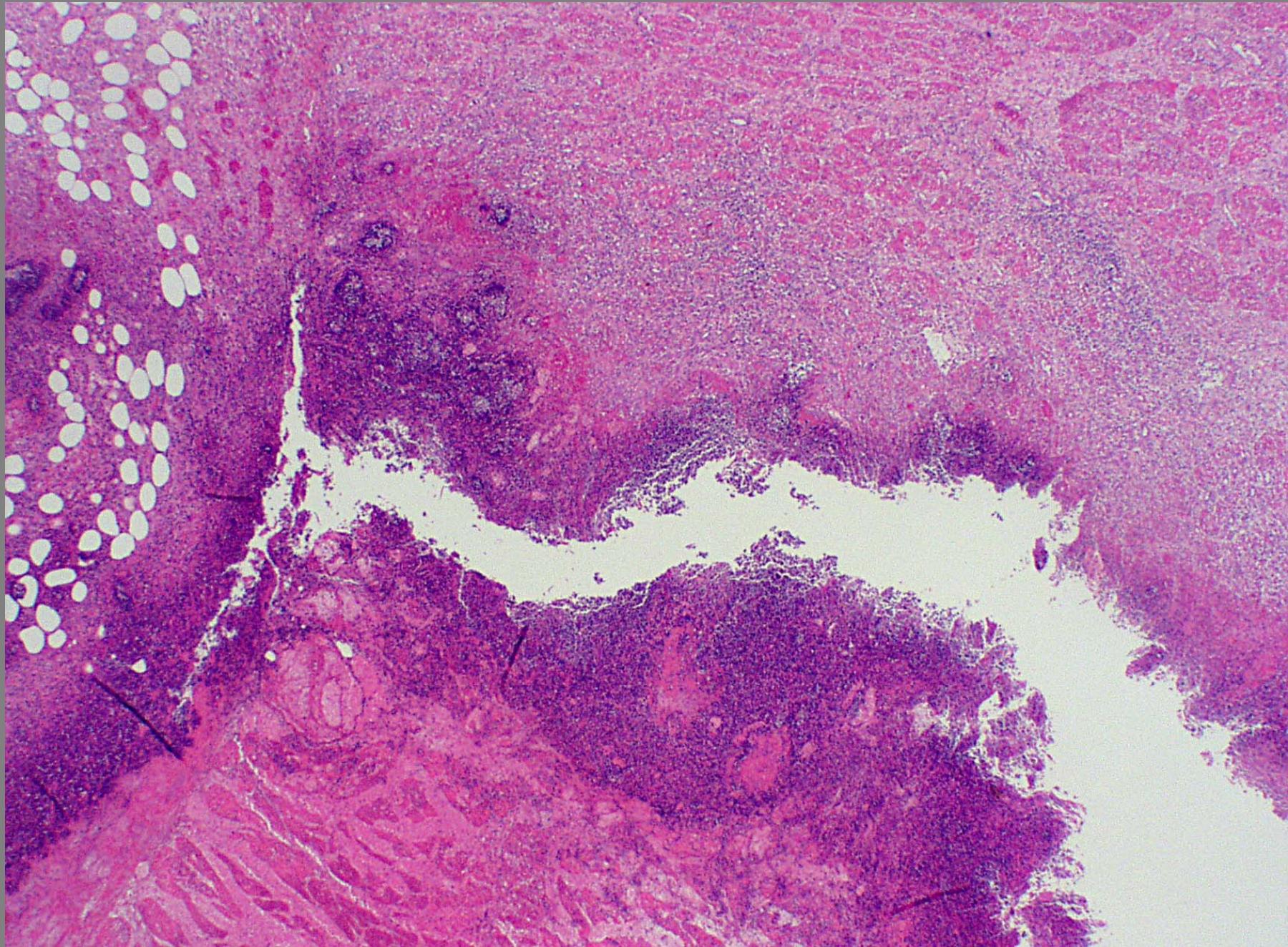
Rumen - grain overload



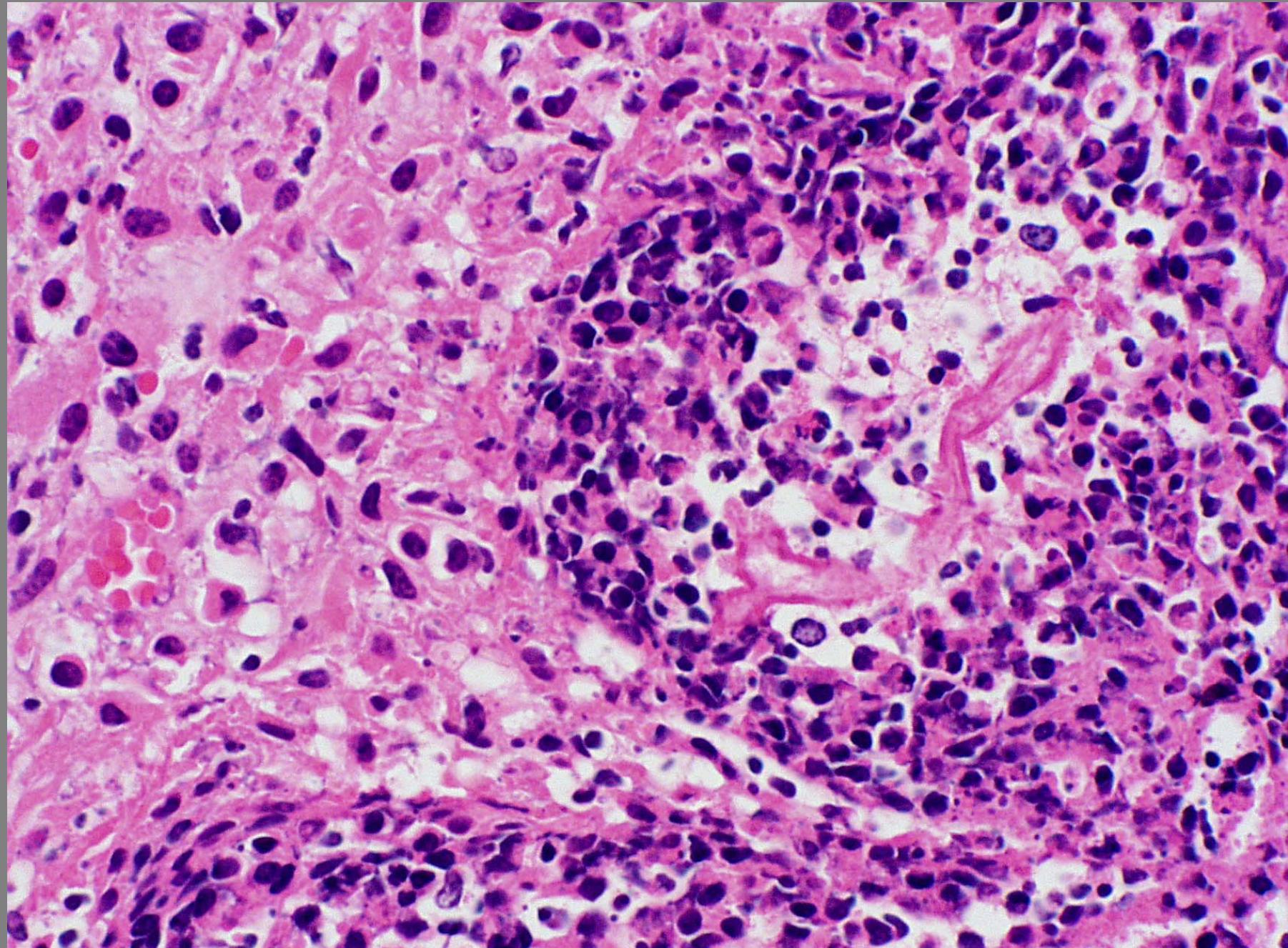
Rumen - grain overload



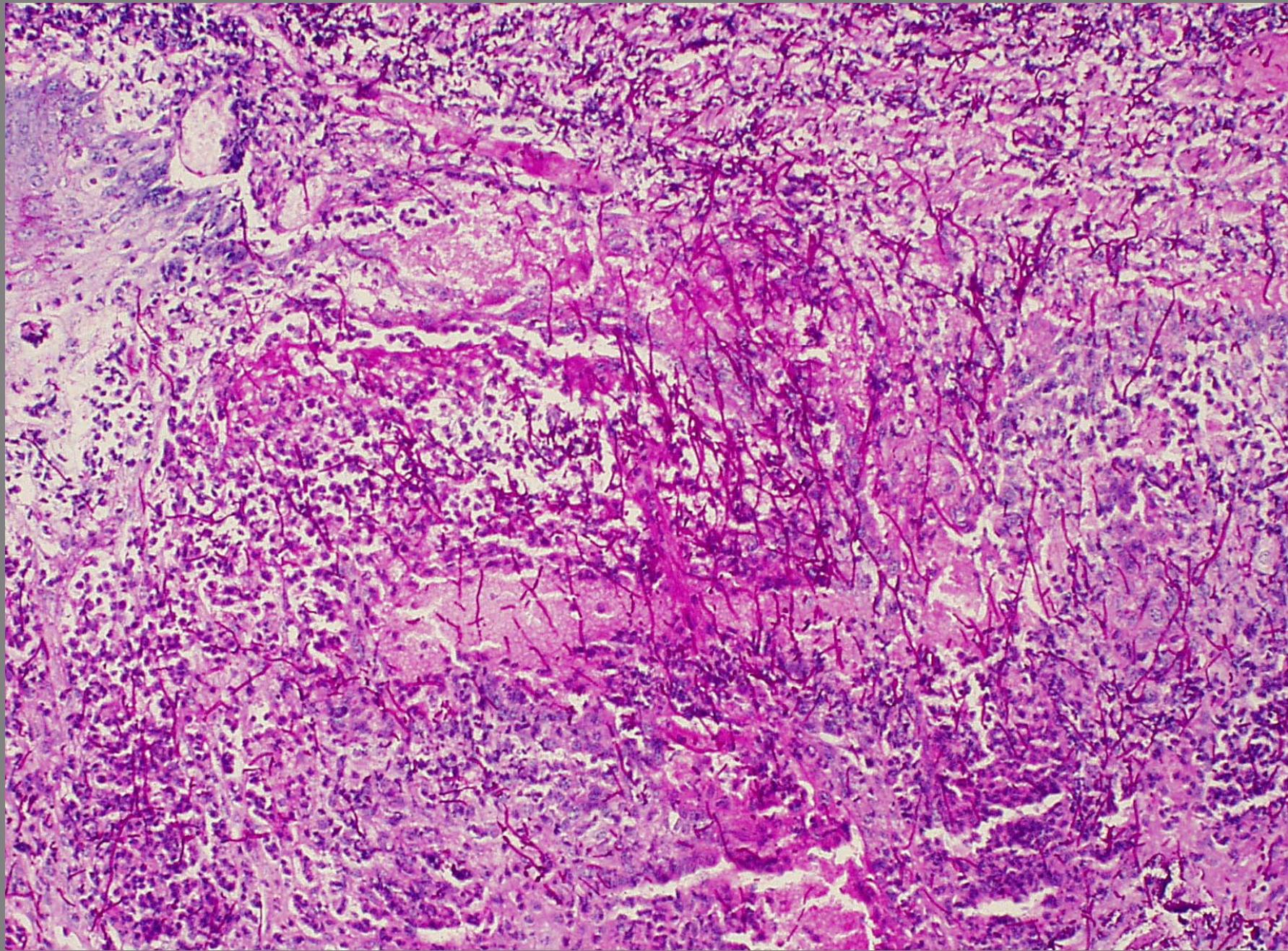
Rumen – necrosis and ulcers – *Toxic ruminitis* –
ruminal acidosis (apple overload in this case)



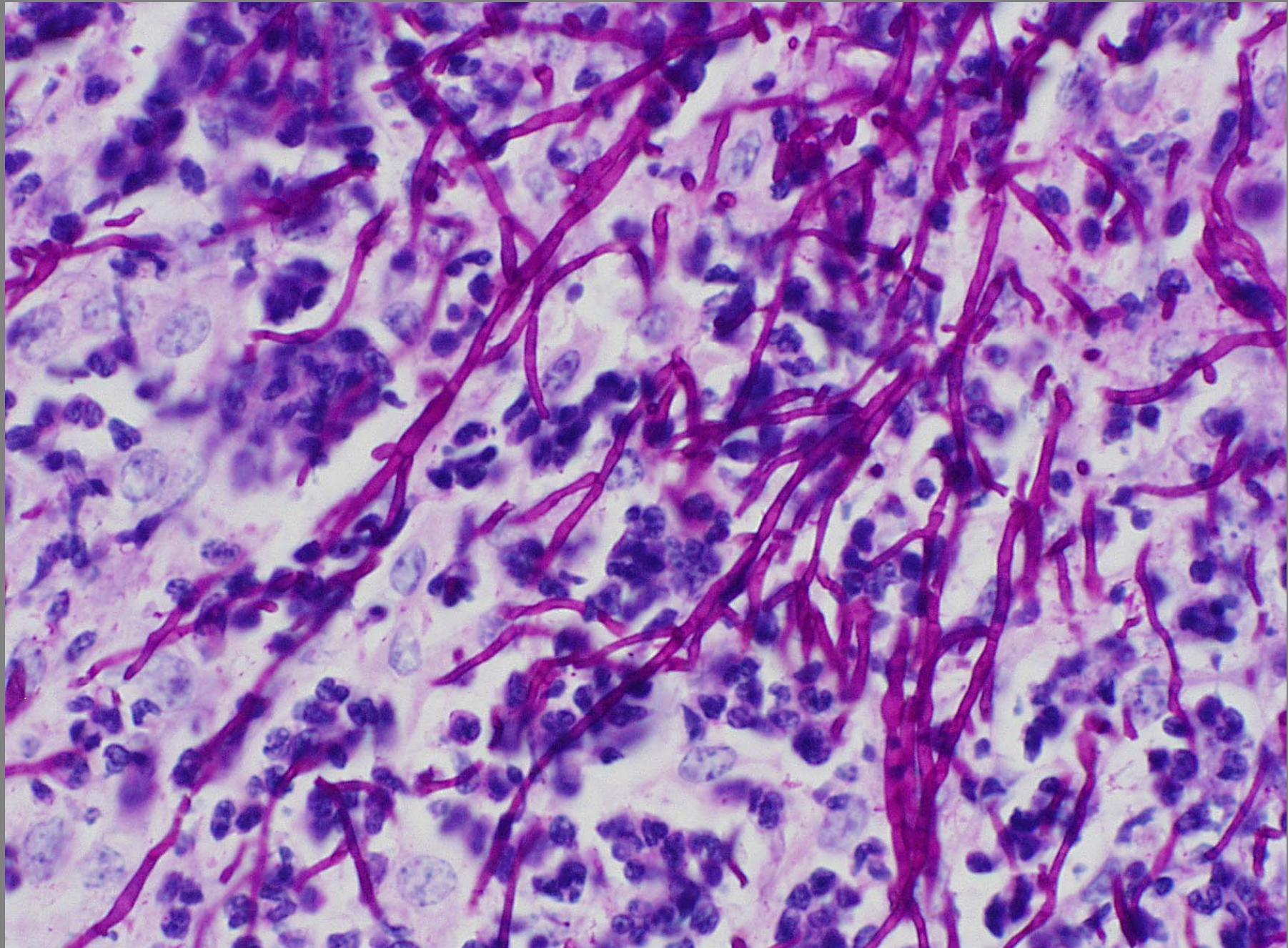
Rumen – wall necrosis – bacteria and fungi



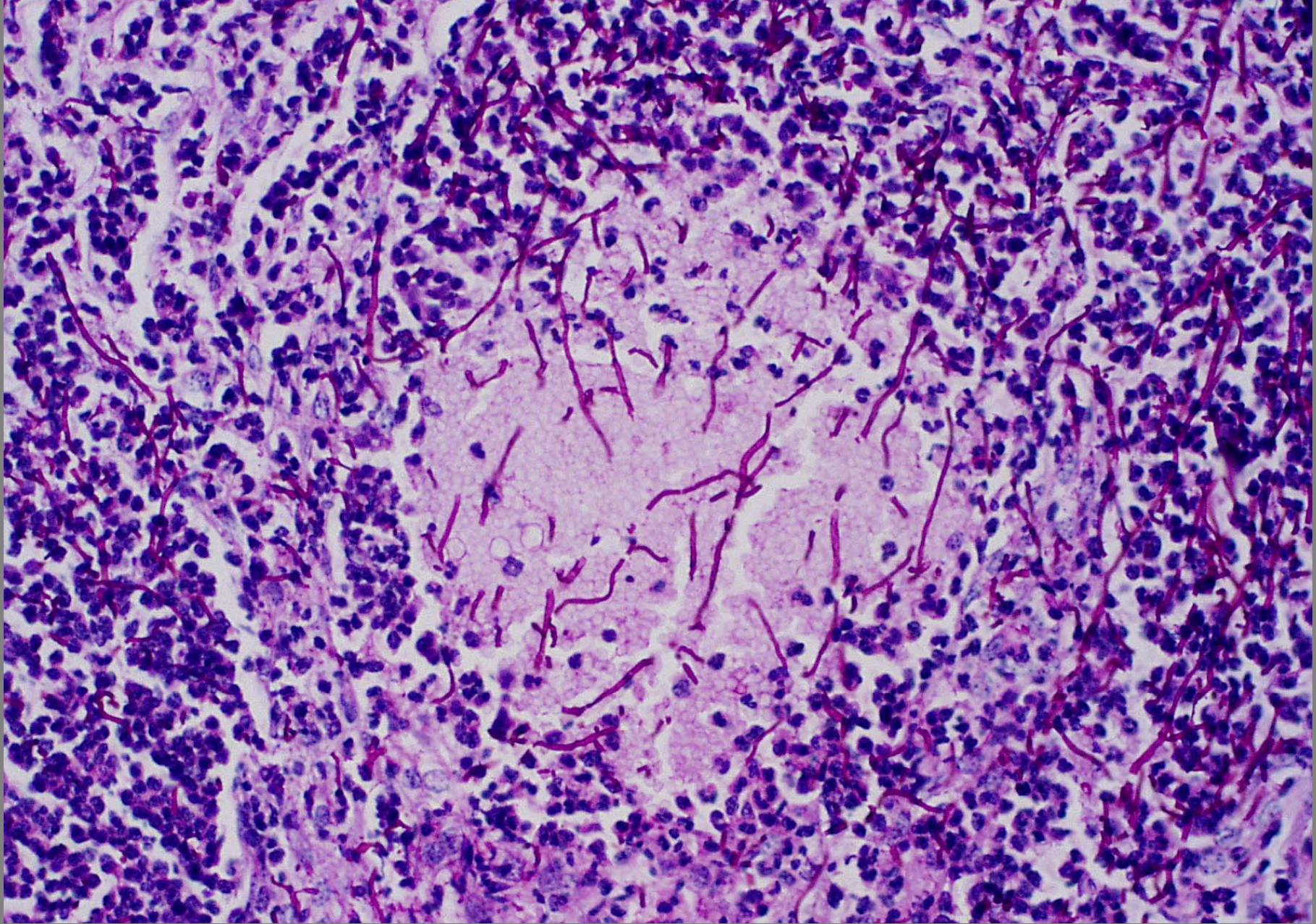
Rumen – mycotic ruminitis – Zygomycetes



Rumen – mycotic ruminitis – *Candida* spp.



Rumen – mycotic ruminitis – *Candida* spp.



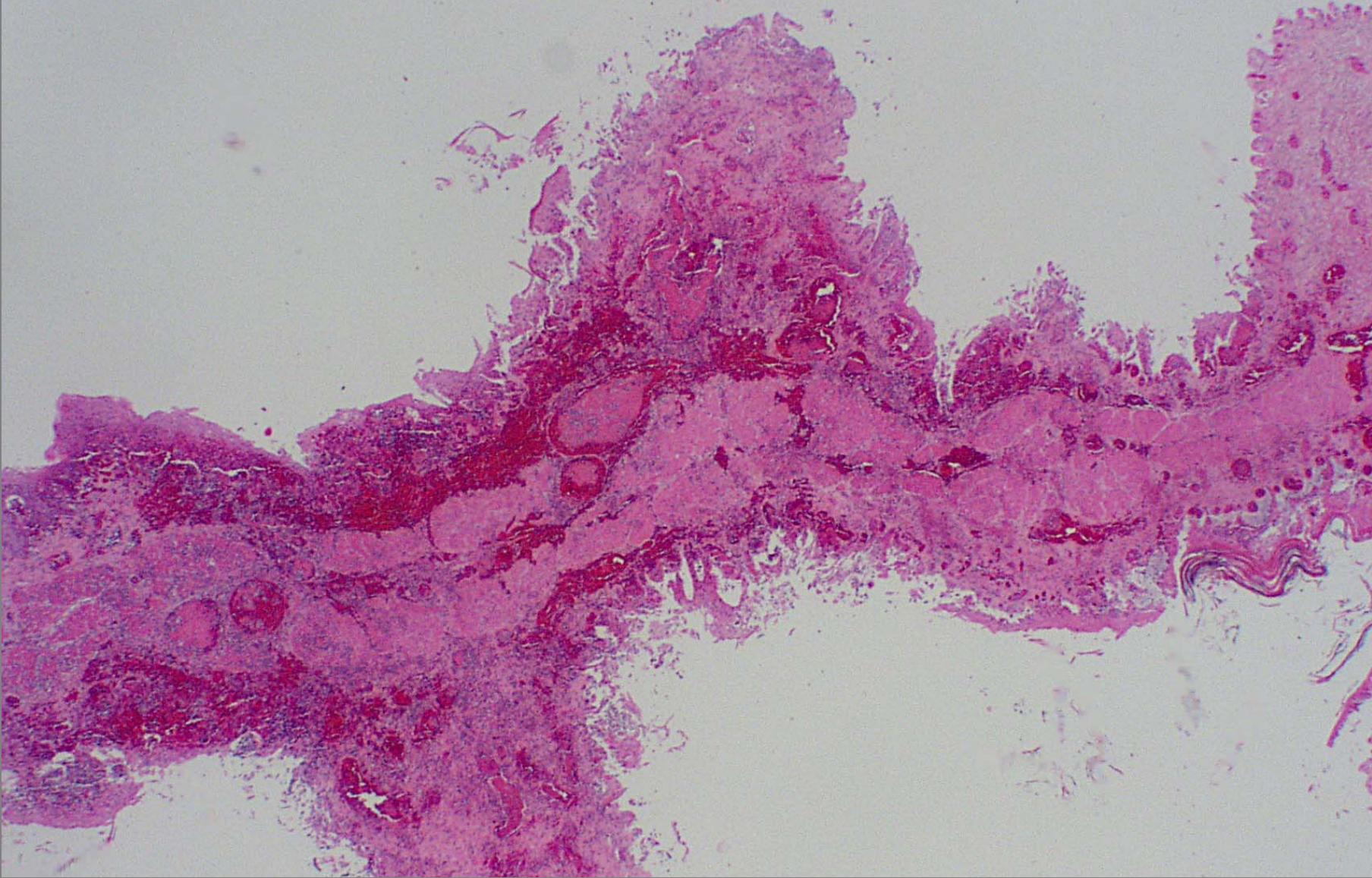
Rumen – mycotic ruminitis – *Candida* spp.



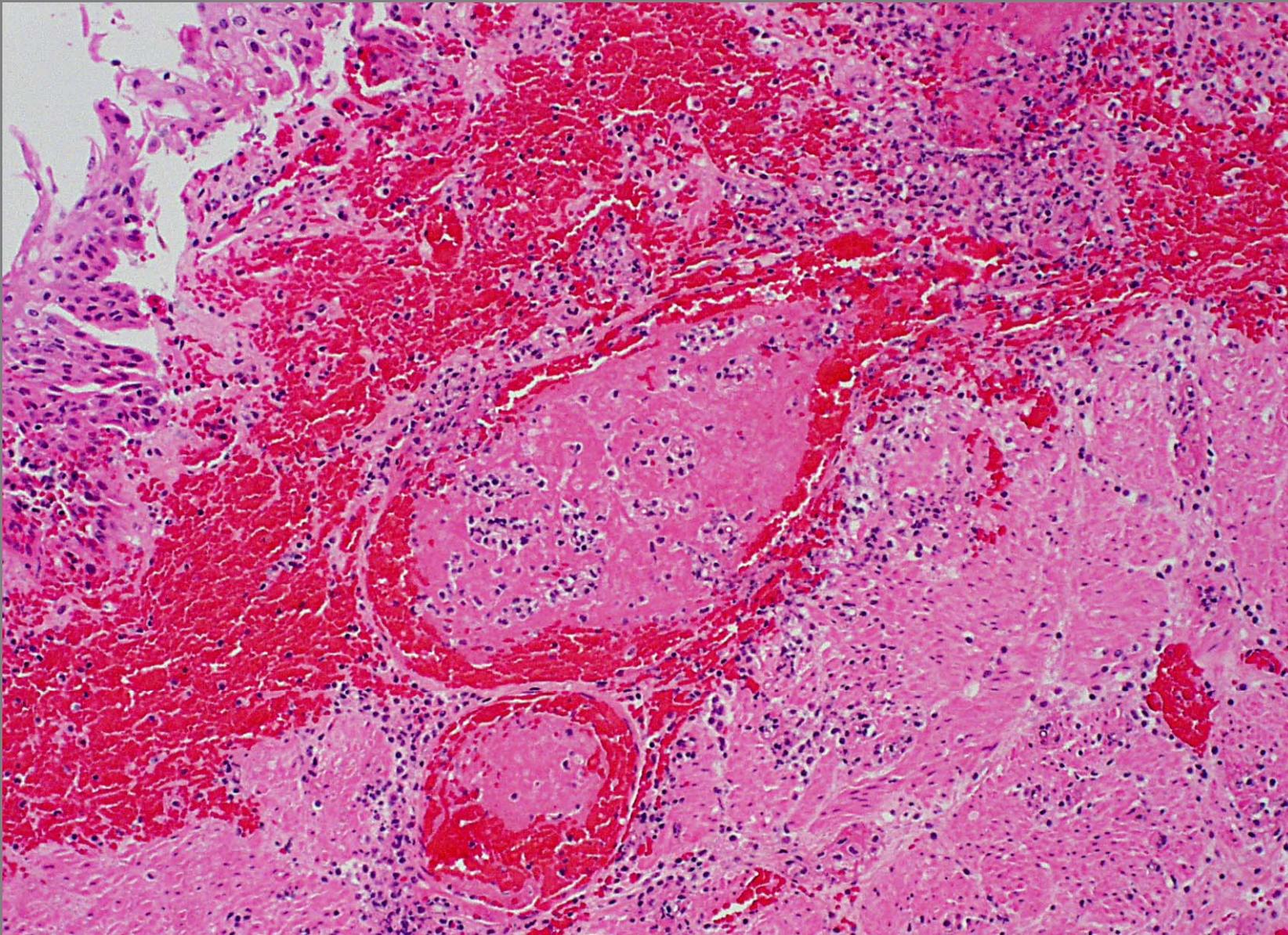
Necrohemorrhagic mycotic omasitis



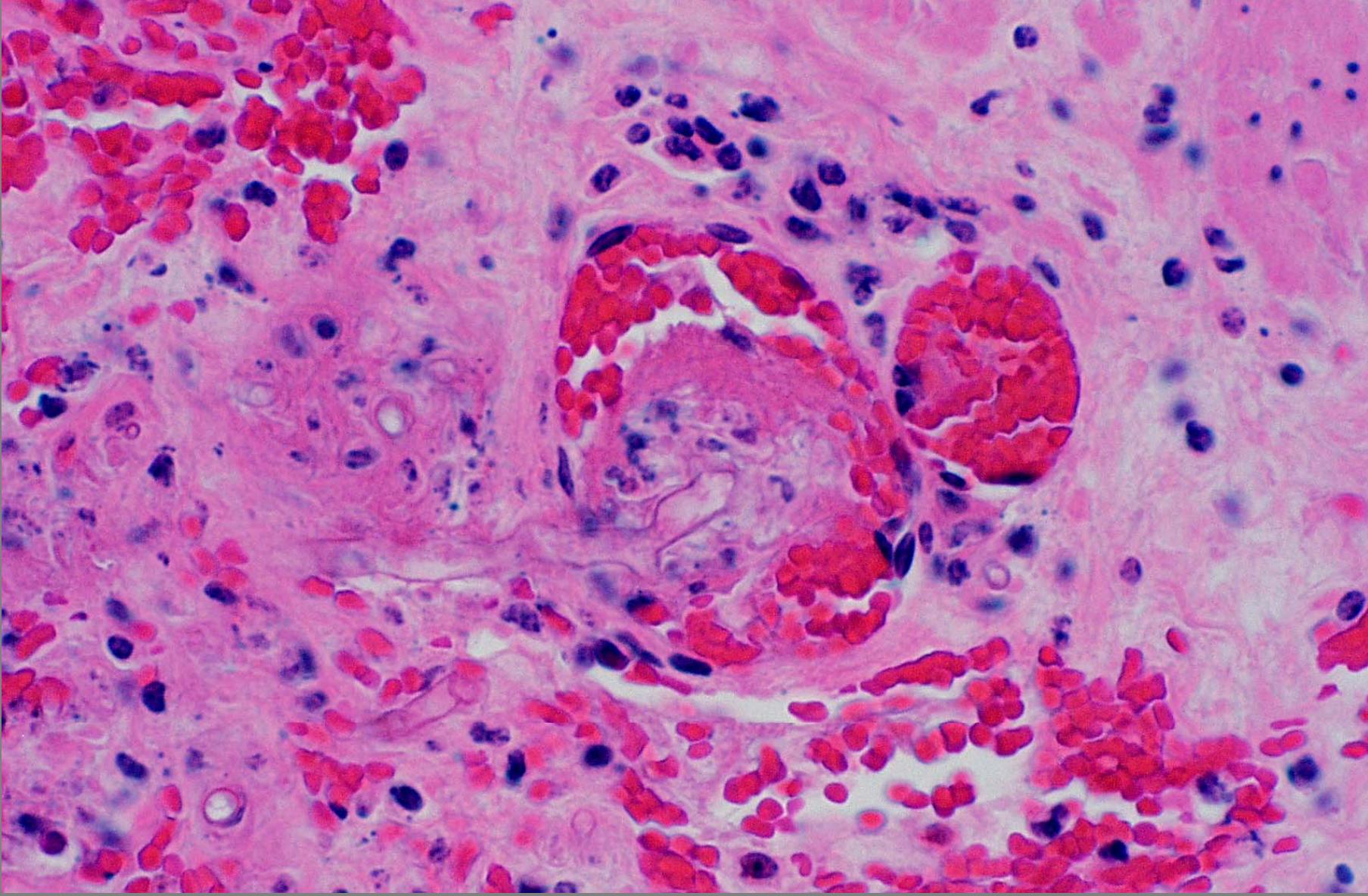
Reticulum wall – hemorrhagic necrosis –
Zygomycetes



Reticulum wall – hemorrhagic necrosis –
Zygomycetes



Reticulum wall – thrombosis and hemorrhagic necrosis – Zygomycetes



Reticulum wall – thrombosis and hemorrhagic necrosis – Zygomycetes



Rumen – chronic ulcers



What has this to do with hardware disease?

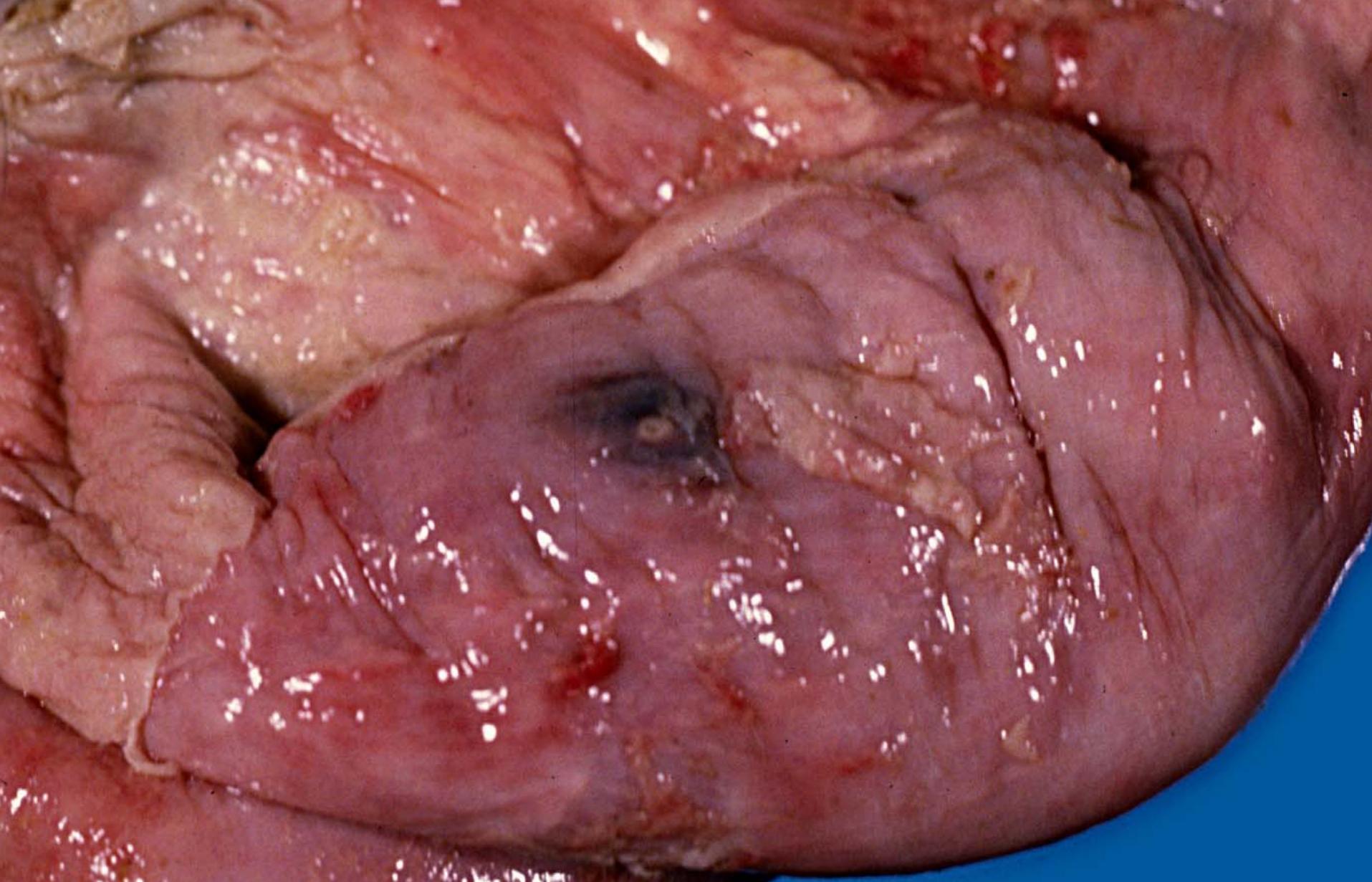


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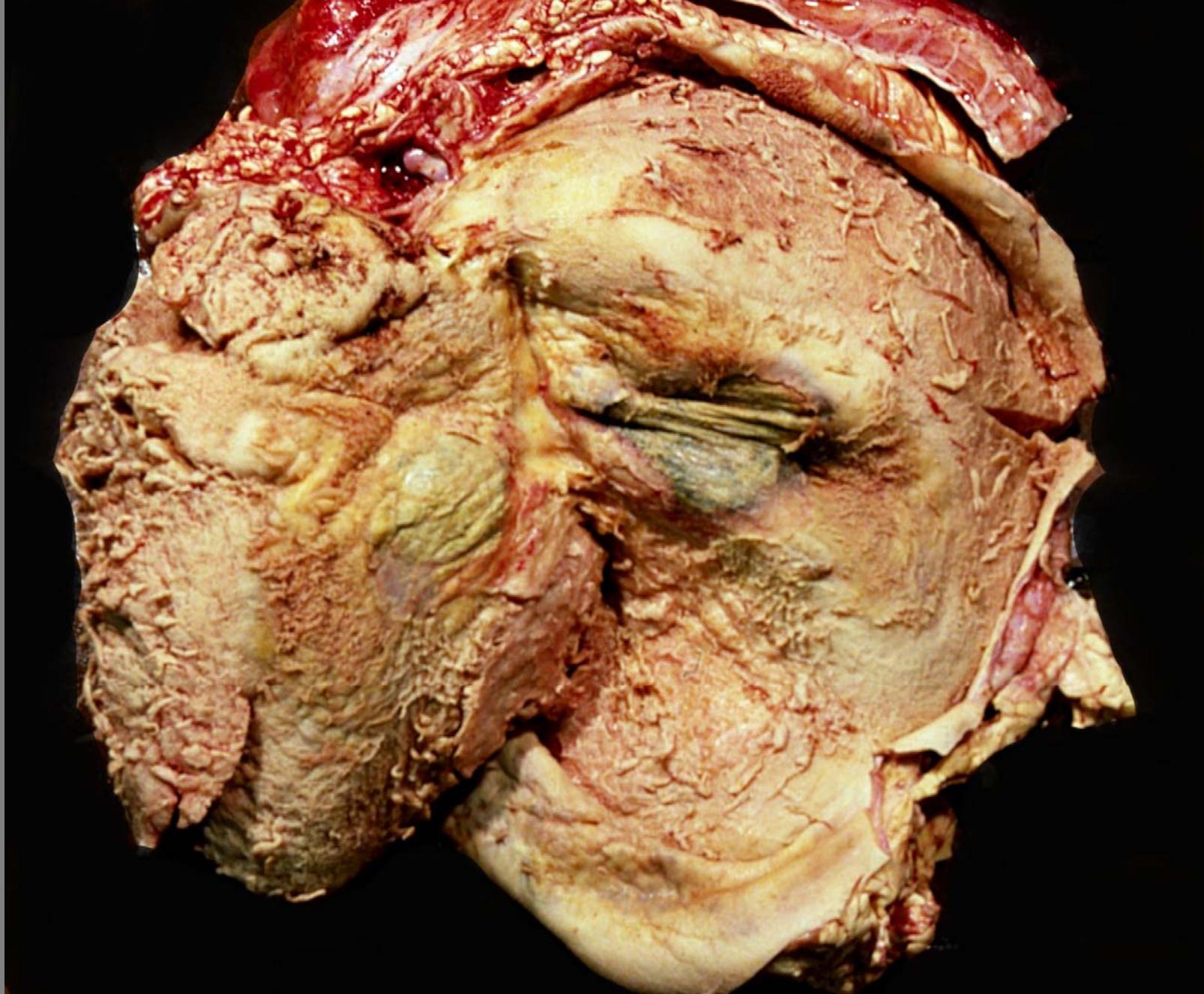
Hardware disease – culprits



Famous John King hardware collection



Hardware disease - visceral perforation and focal peritonitis



Traumatic fibrinous pericarditis - reticular hardware



Reticulum - clinically insignificant hardware



Veal calf – trichobezoars (pilobezoars, hairballs)



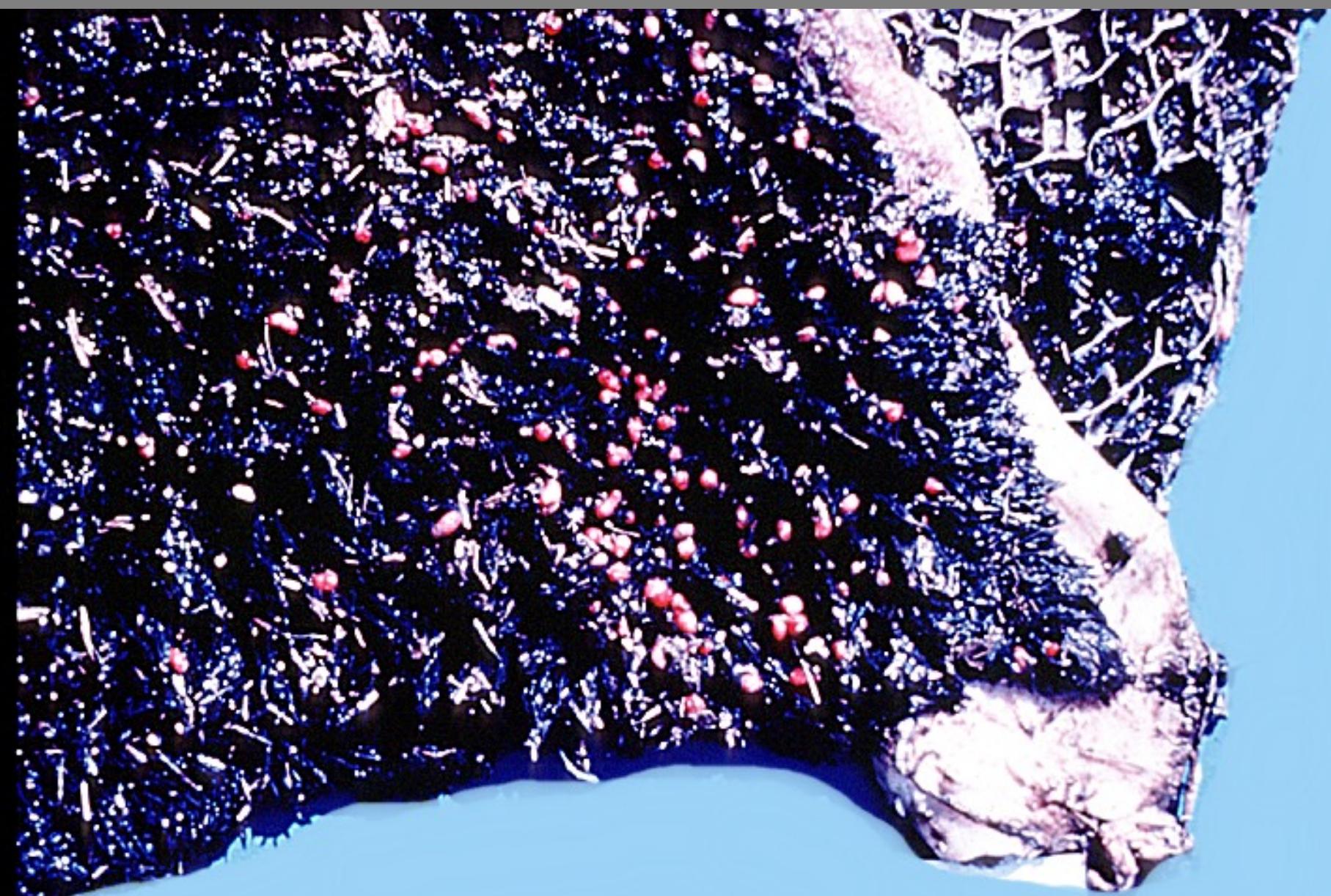
Intraruminal calcified rope with plastic



Japanese yew (*Taxus japonica*) - rumen



Castanospermum australe – intestinal
hemorrhages (enterotoxemia-like lesions)



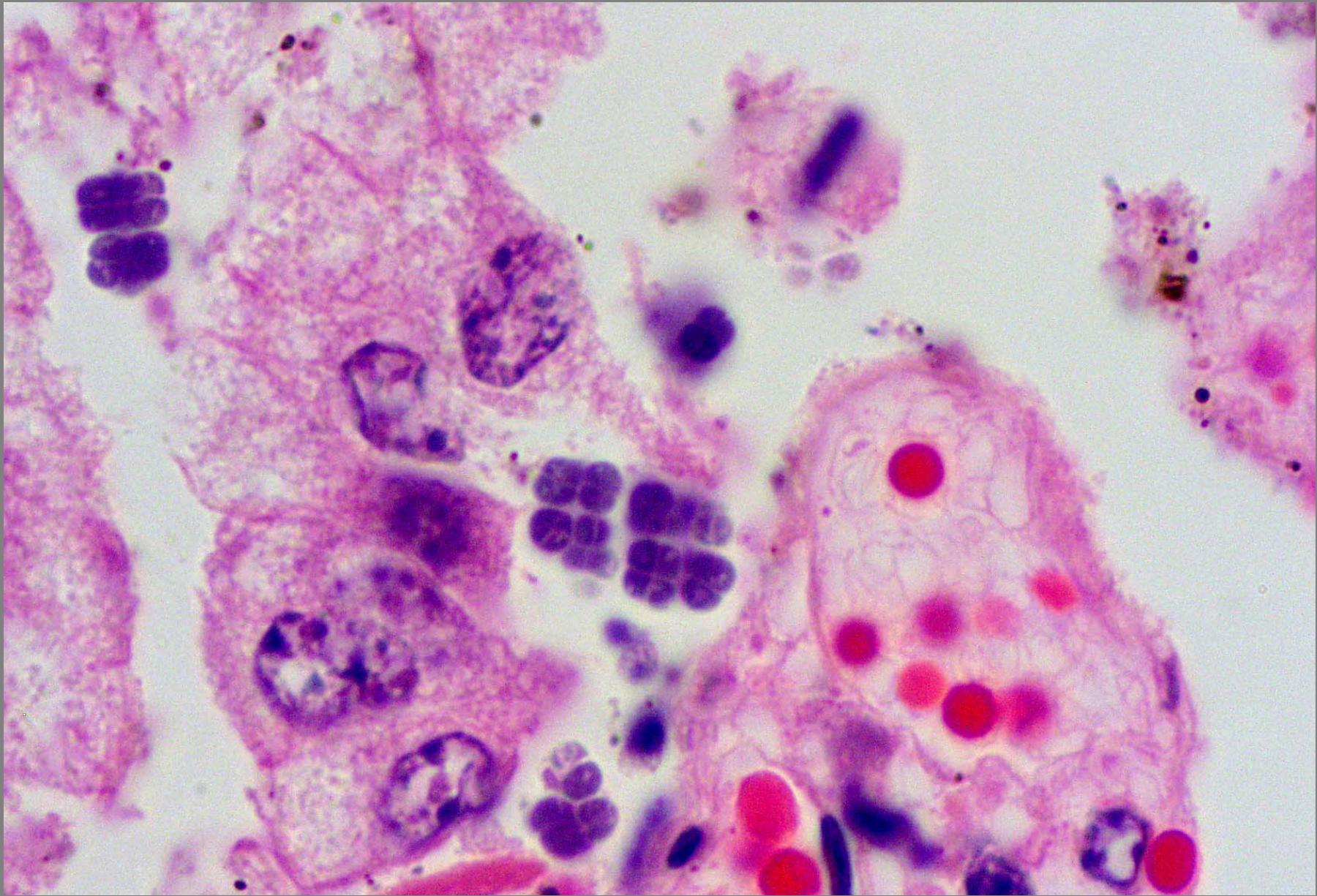
Forestomachs – *Paramphistomum cervi* - adults



Rumen – hypertrophic papillae - less fiber in diet



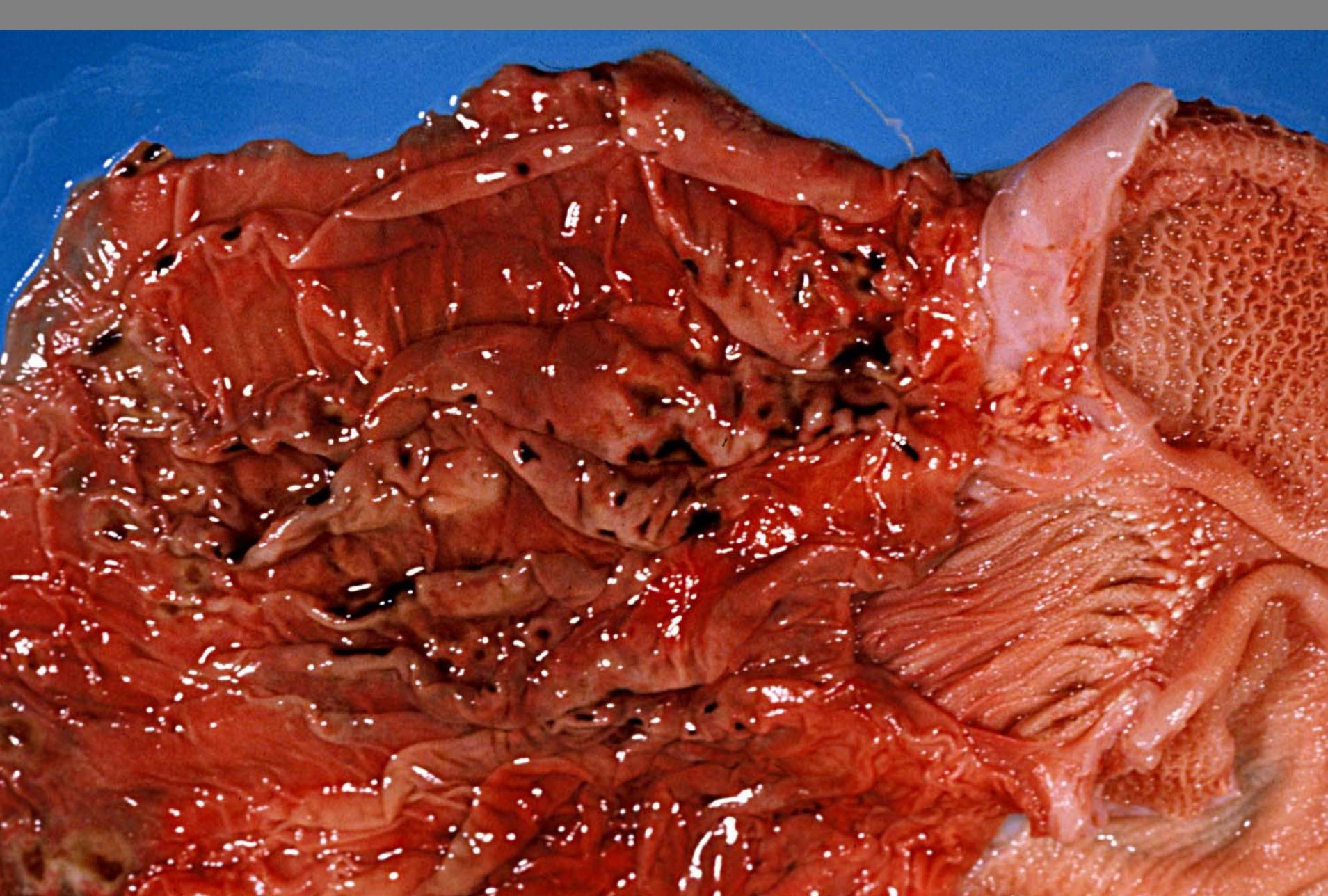
Calf - abomasum – hemorrhagic necrosis with perforation –
Braxy-like – *Clostridium* spp. (presumptive) and *Sarcina* spp.



Calf - Abomasum - Hemorrhagic necrosis, extreme edema with perforation – Braxy-like – *Clostridium* spp. (presumptive) and *Sarcina* spp.



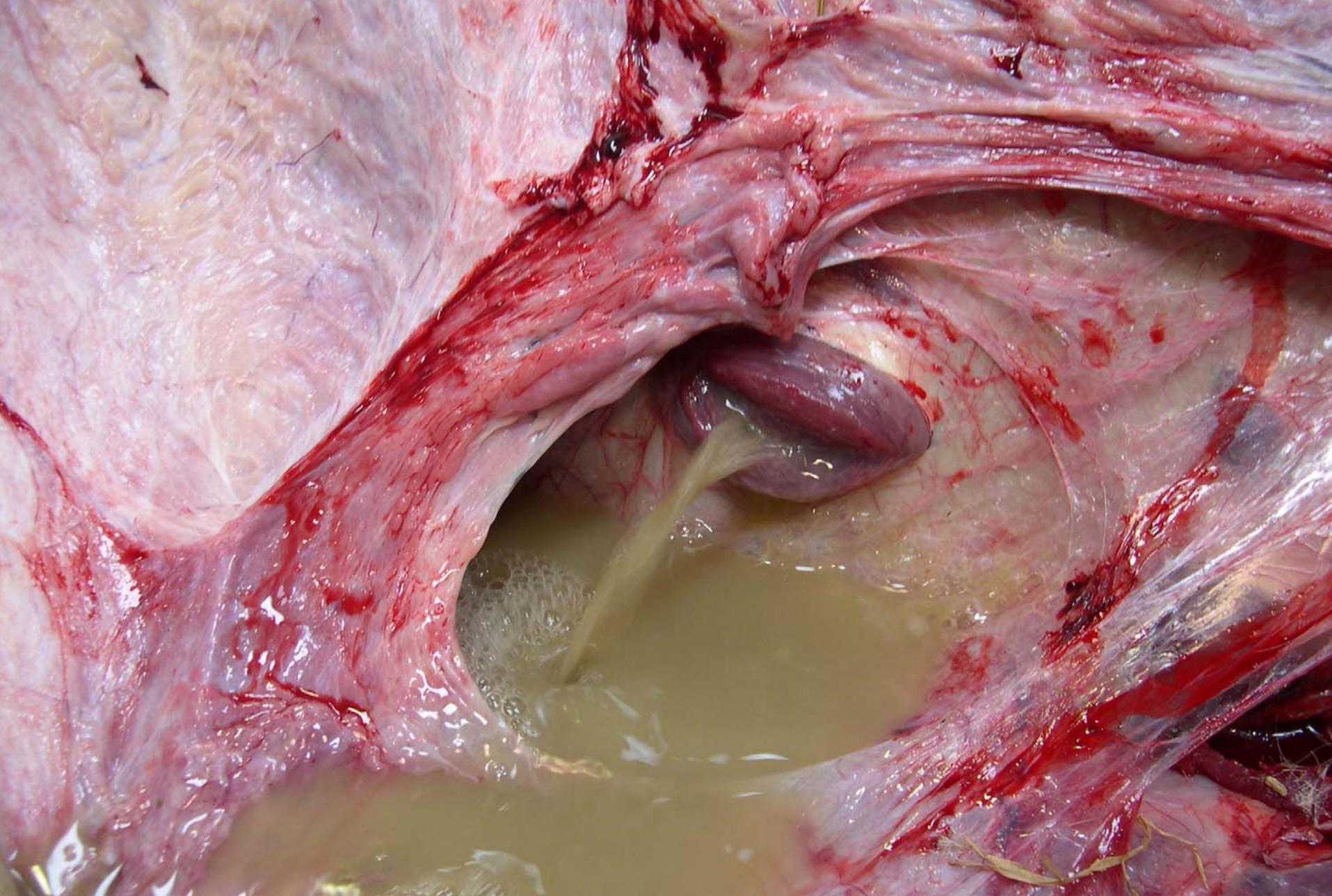
Calf - Abomasum – Linear ulcers and edema –
sepsis, inanition, stress, other



Abomasum – Ulcers.



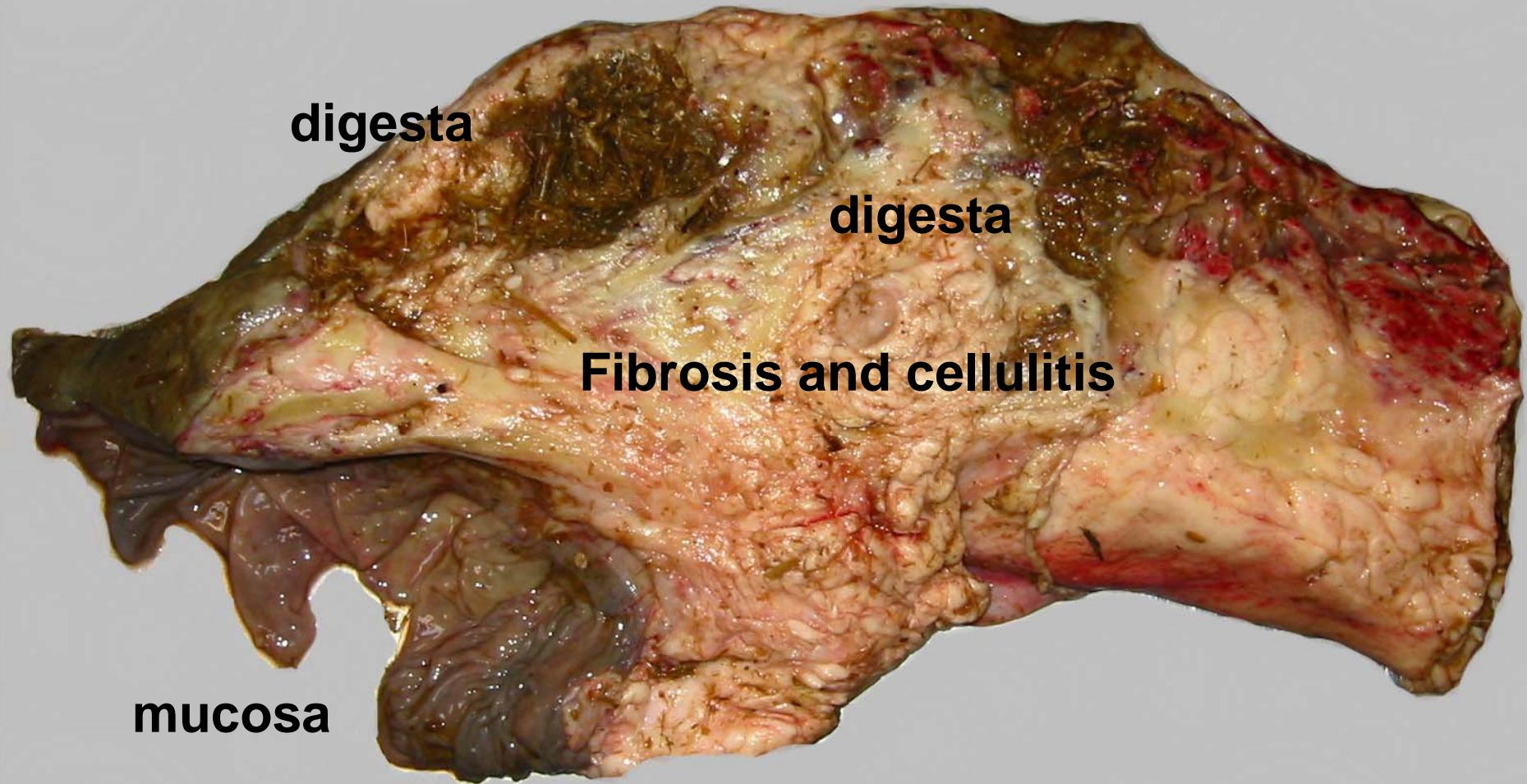
Calf – abomasum – perforating ulcer



Septic peritonitis due to abomasal perforating ulcer



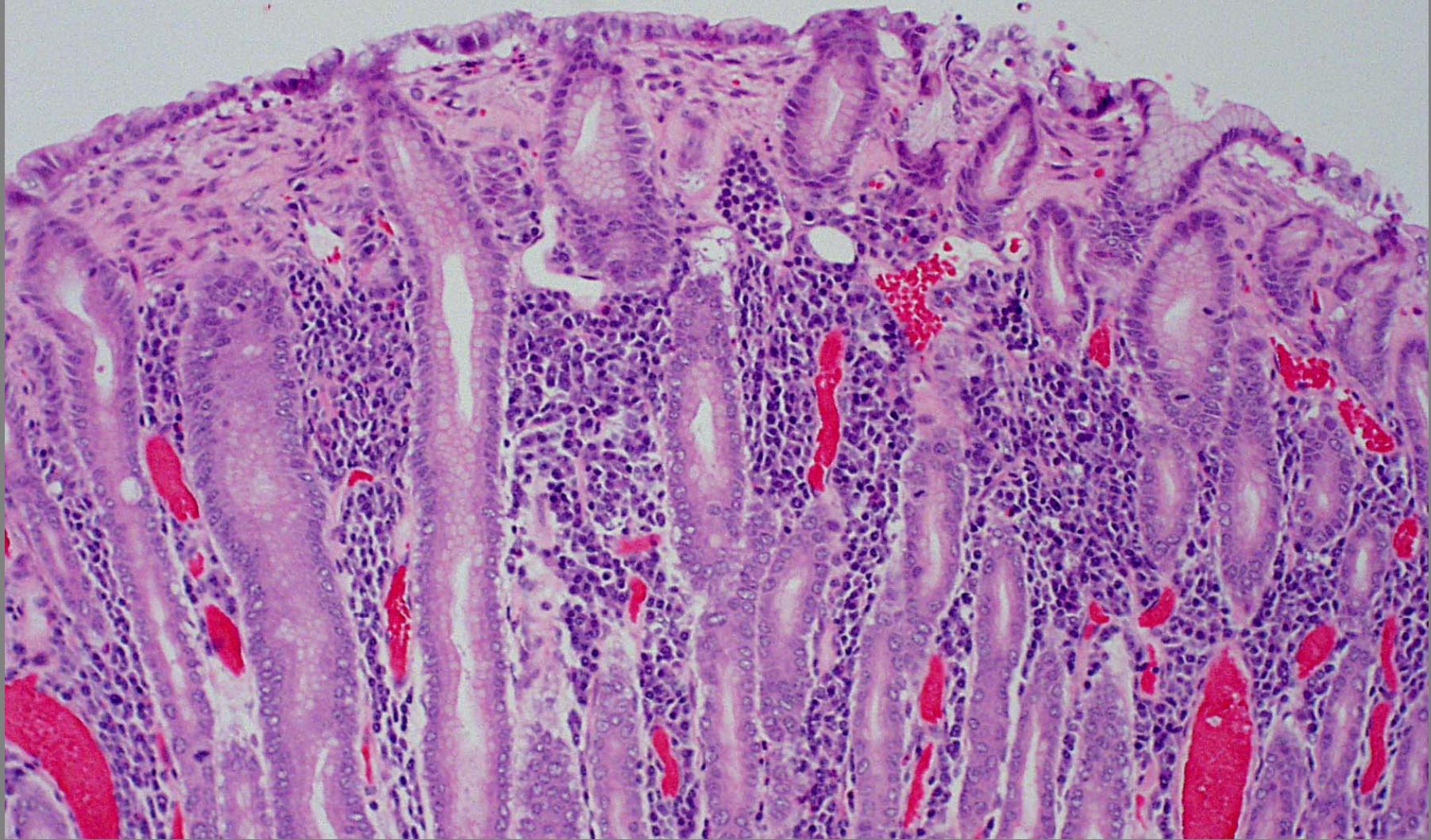
Abomasum perforating ulcer with septic fibrinous peritonitis



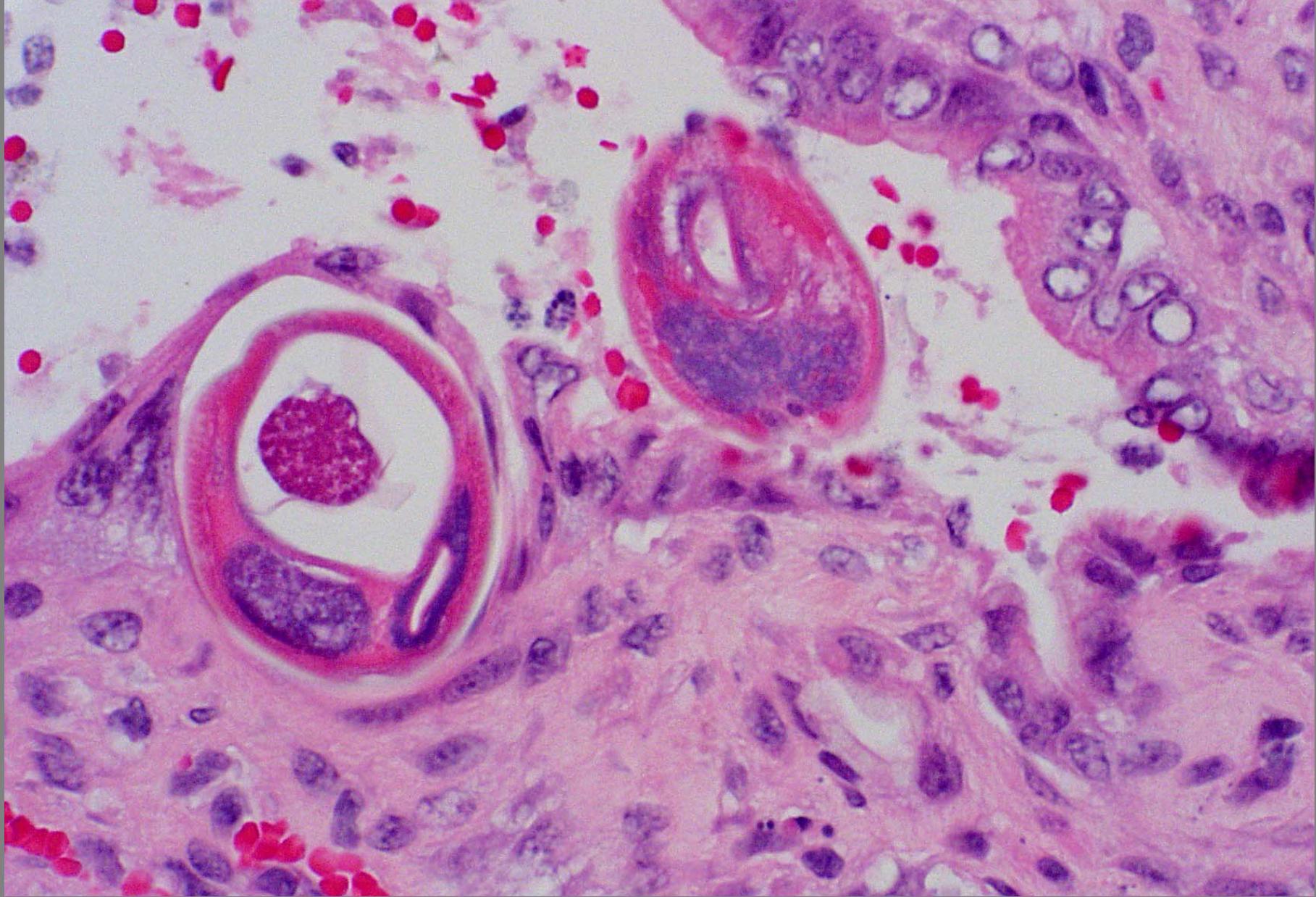
Periabomasal cellulitis with digesta pouch formation and septic peritonitis due to abomasal perforating ulcer



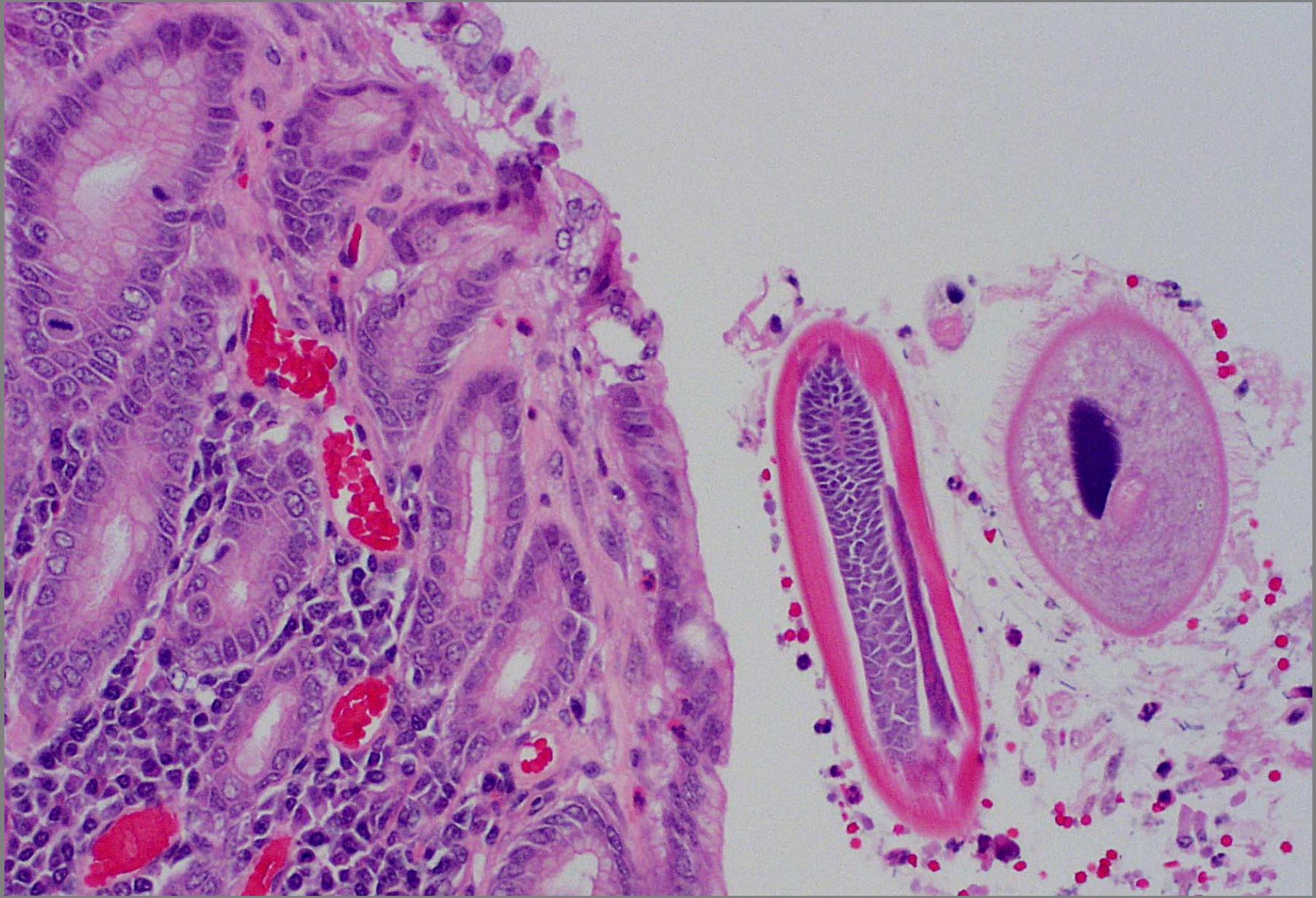
Bison – abomasum – chronic hyperplastic
abomasitis – *Ostertagia* spp.



Bison – abomasum – chronic hyperplastic,
lymphoplasmacytic abomasitis – *Ostertagia* spp.



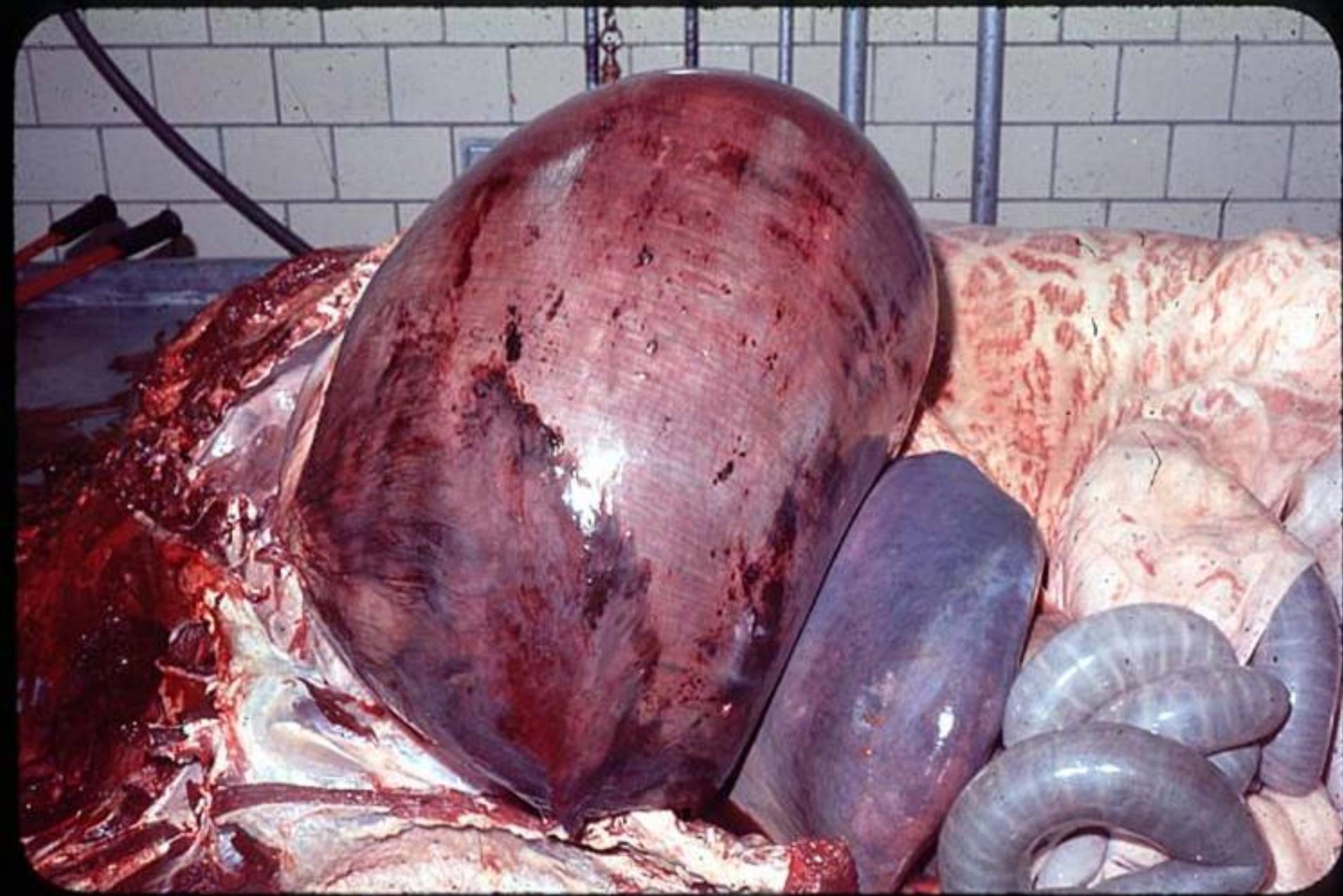
Bison – abomasum – chronic hyperplastic
fibrosing abomasitis – *Ostertagia* spp.



Bison – abomasum – chronic hyperplastic
lymphoplasmacytic fibrosing abomasitis – *Ostertagia* spp.



Bison – abomasum – innocent useful bystander...



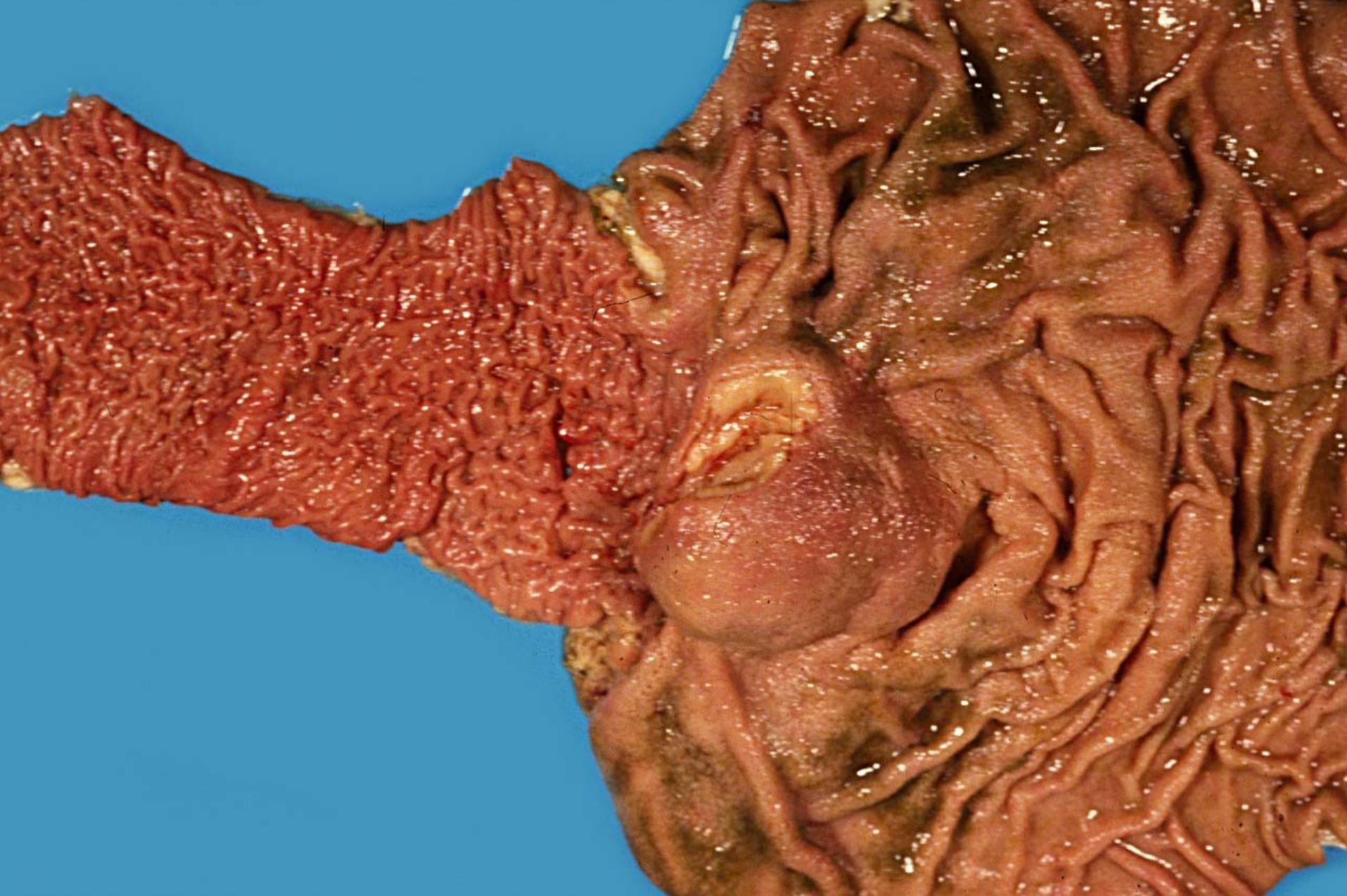
Abomasum – volvolus with ischemic hemorrhagic necrosis



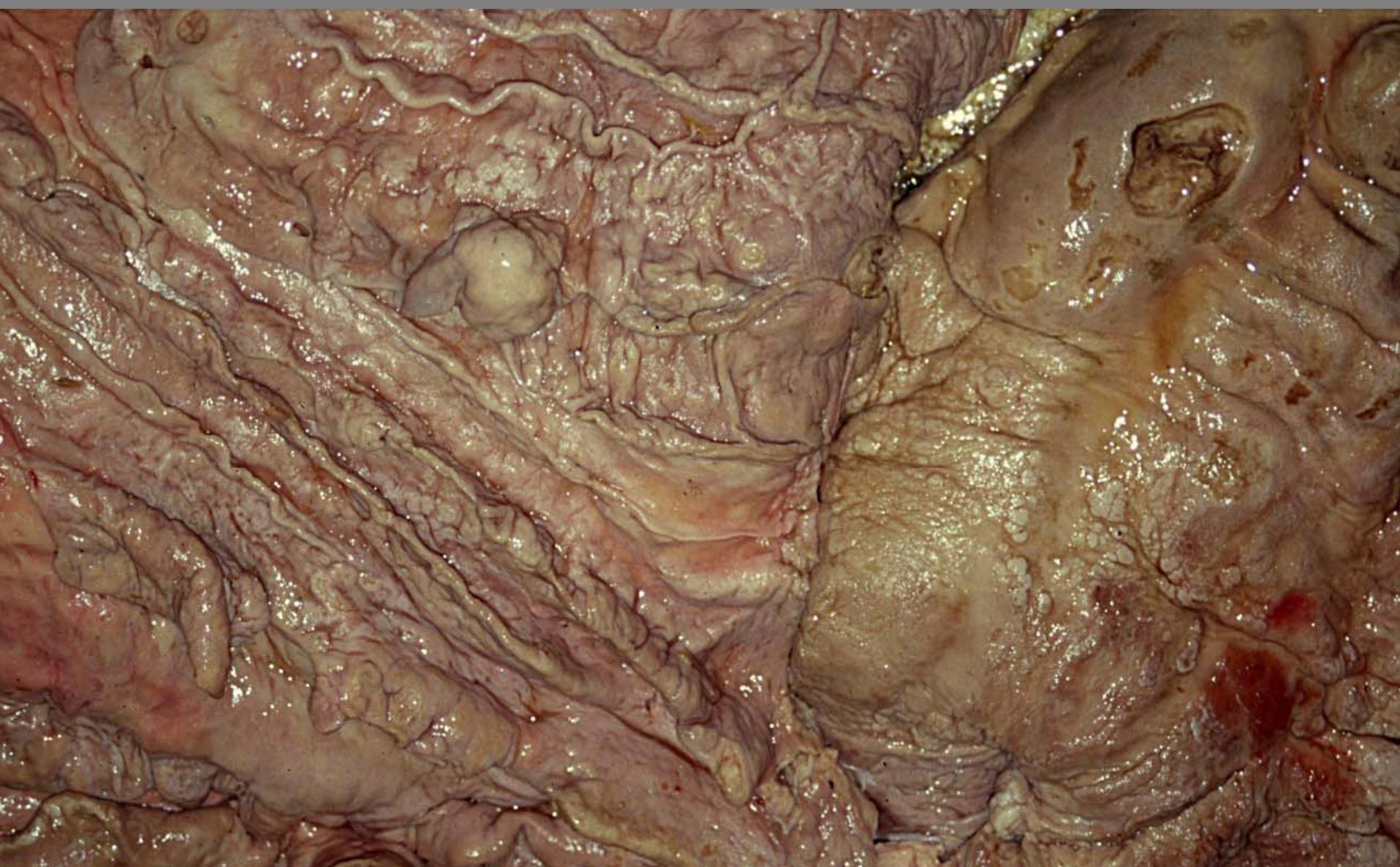
Abomasum rupture



Abomasum – lymphoma



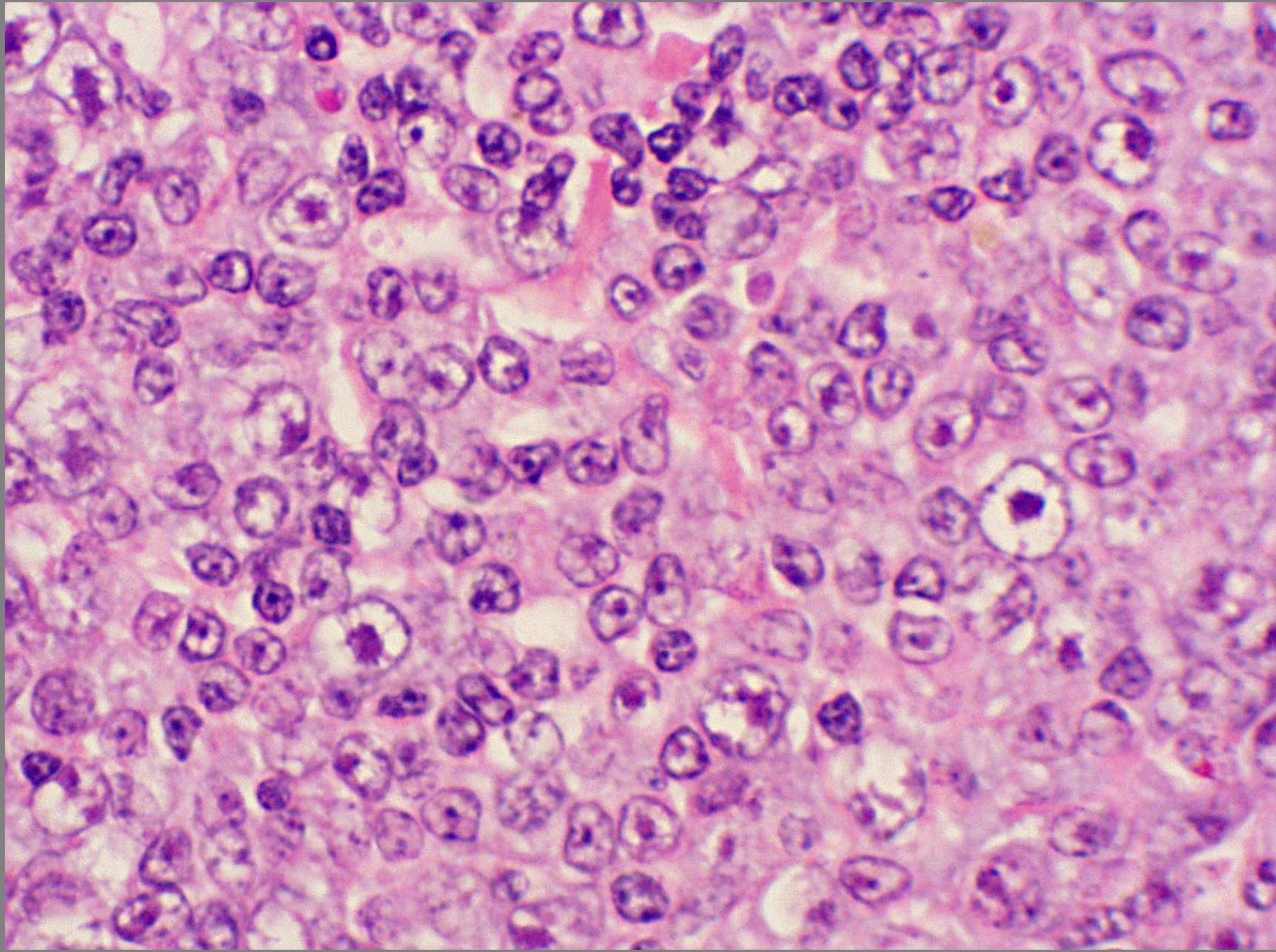
Abomasum – torus pyloricus – lymphoma



Abomasum – lymphoma with necrosis and ulcers



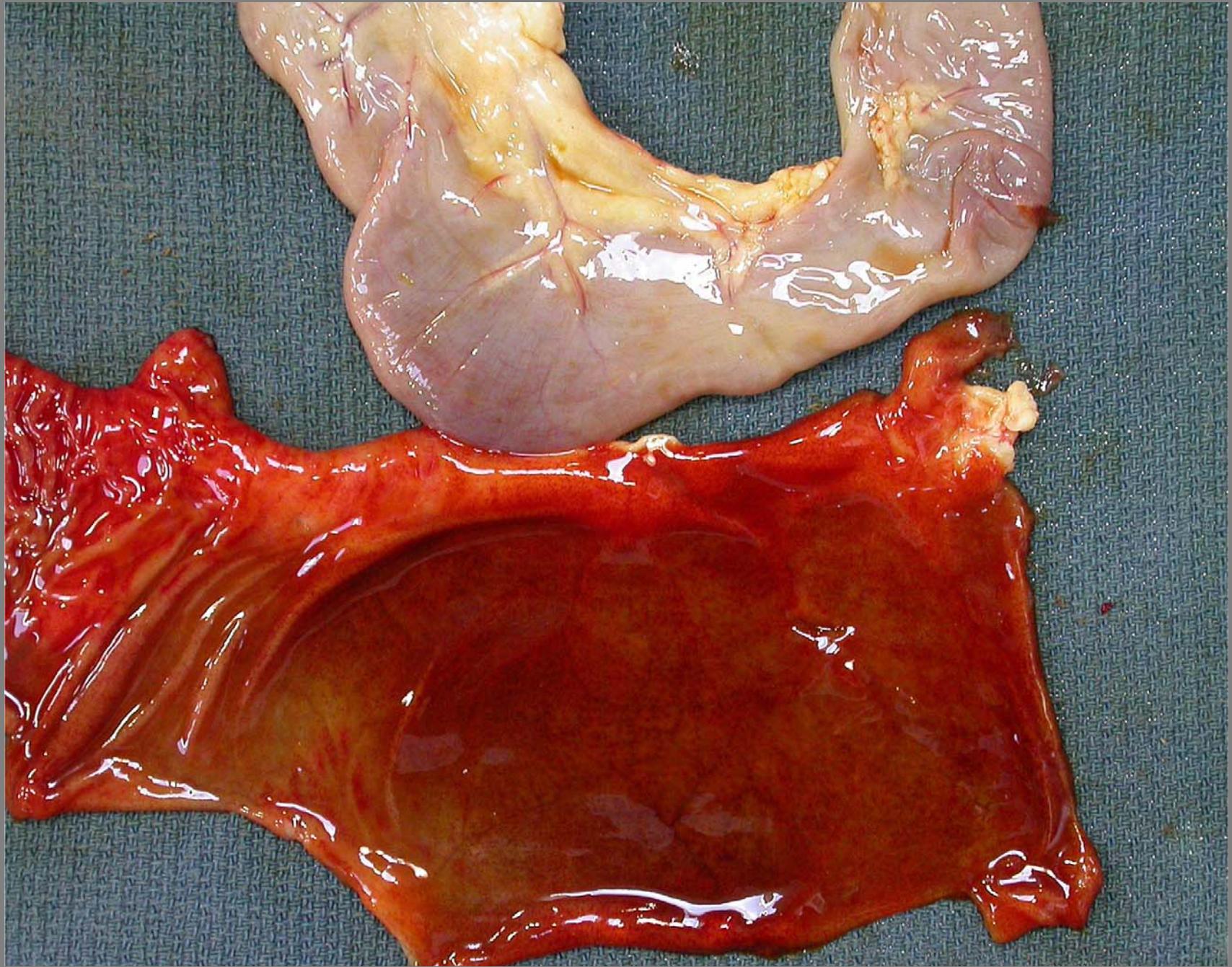
Abomasum – lymphoma



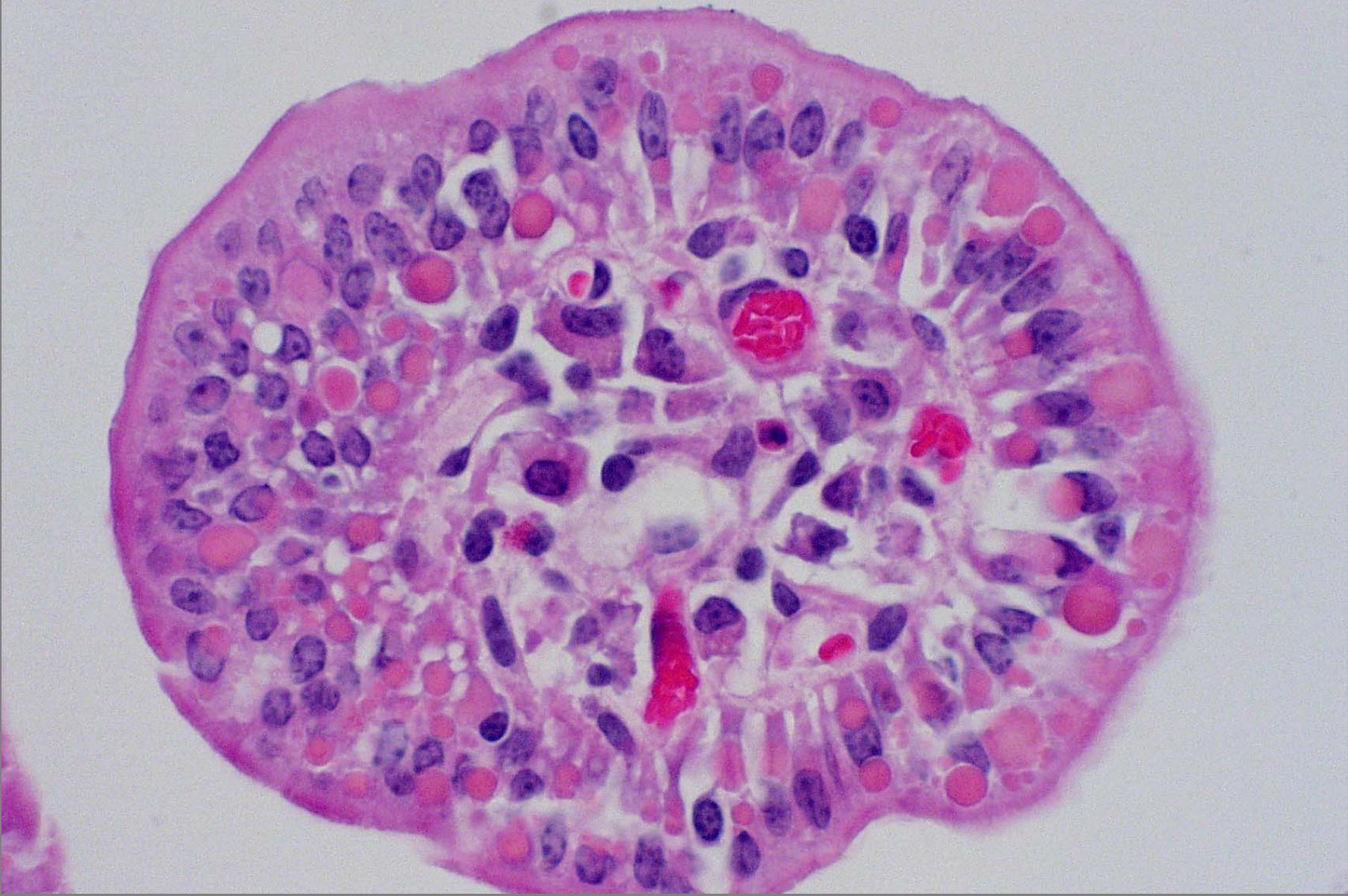
Abomasum – lymphoma



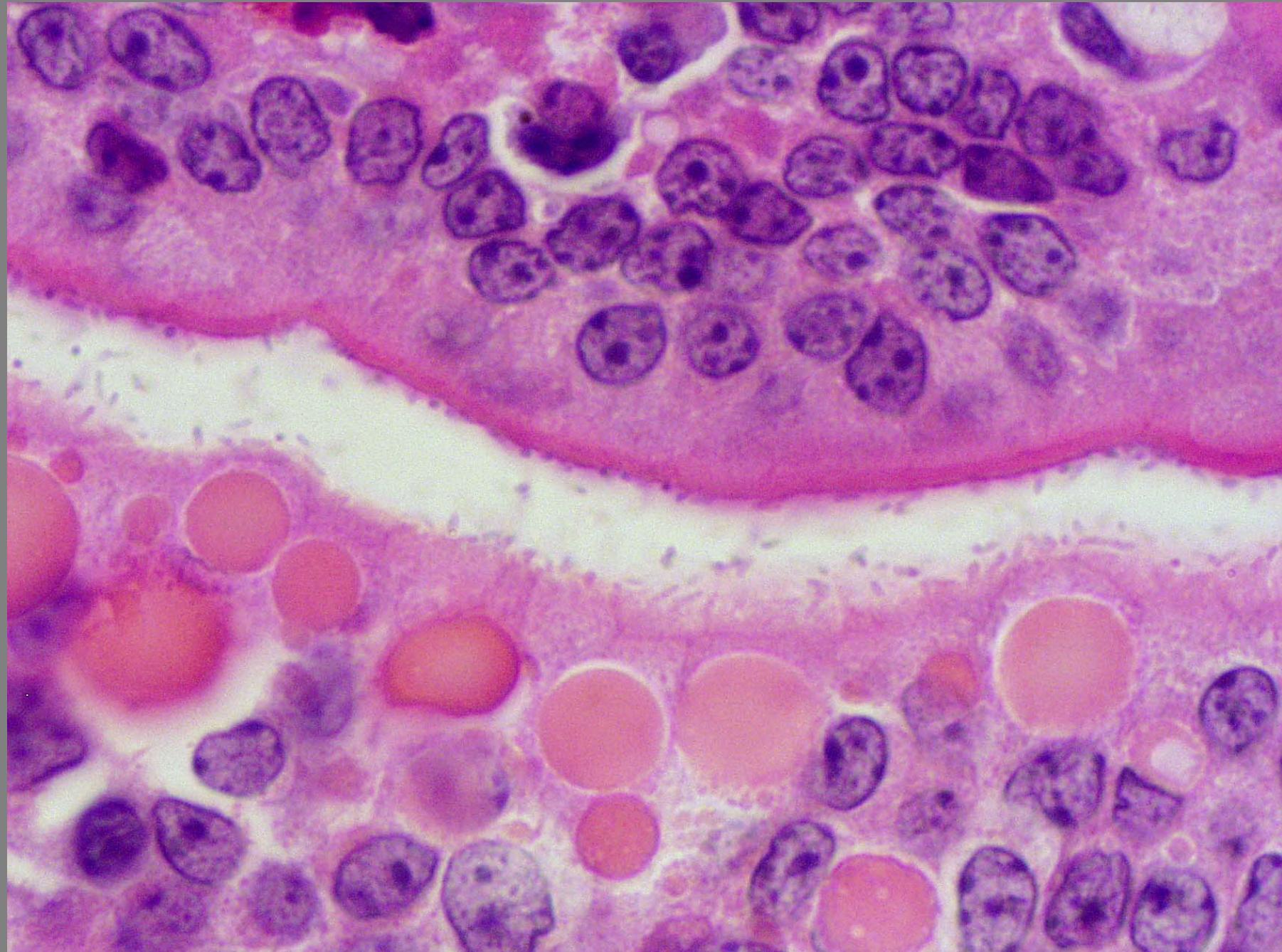
Calf – diarrhea and dehydration – enteric salmonellosis



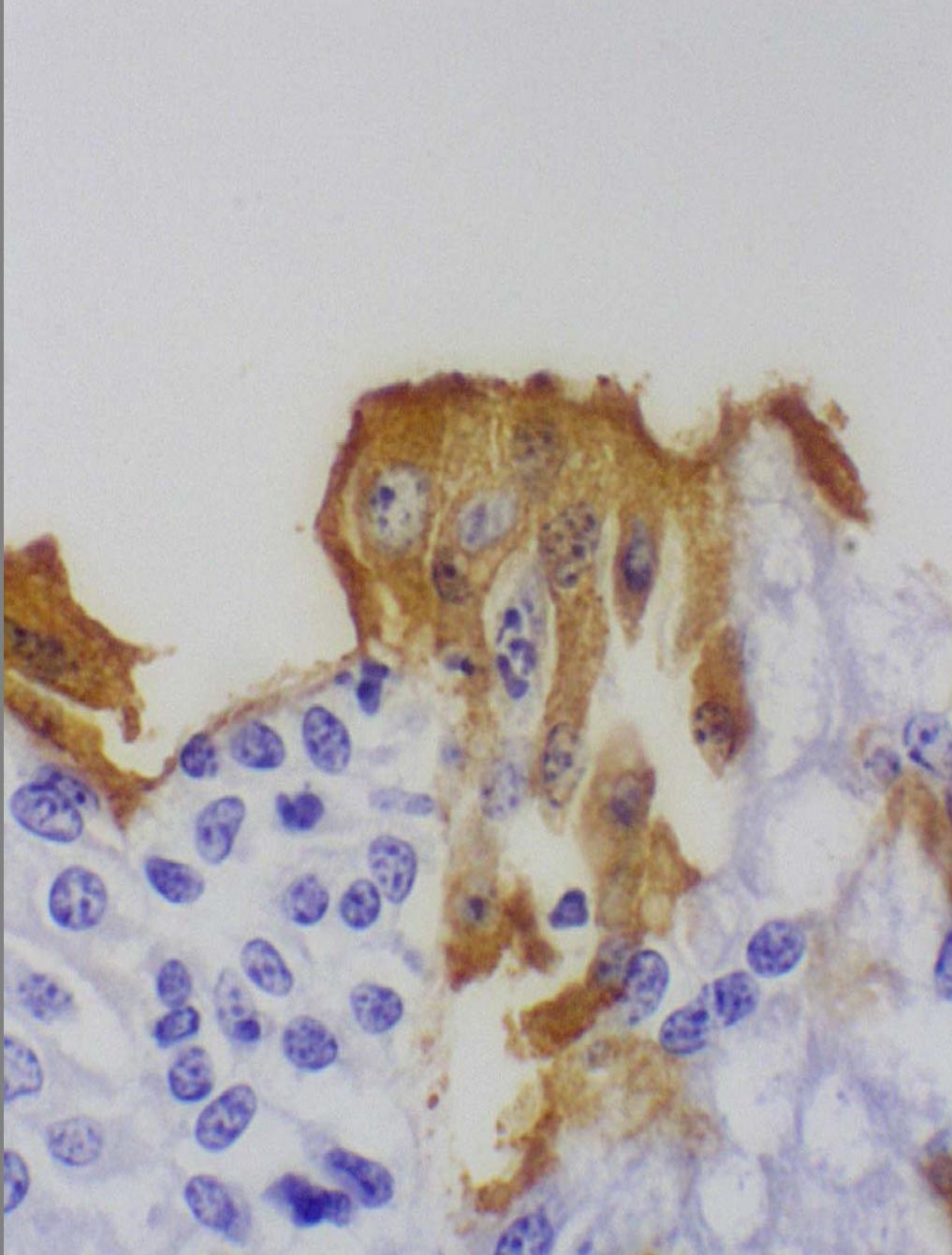
Small intestine – enteritis – BVDV + BV coronavirus



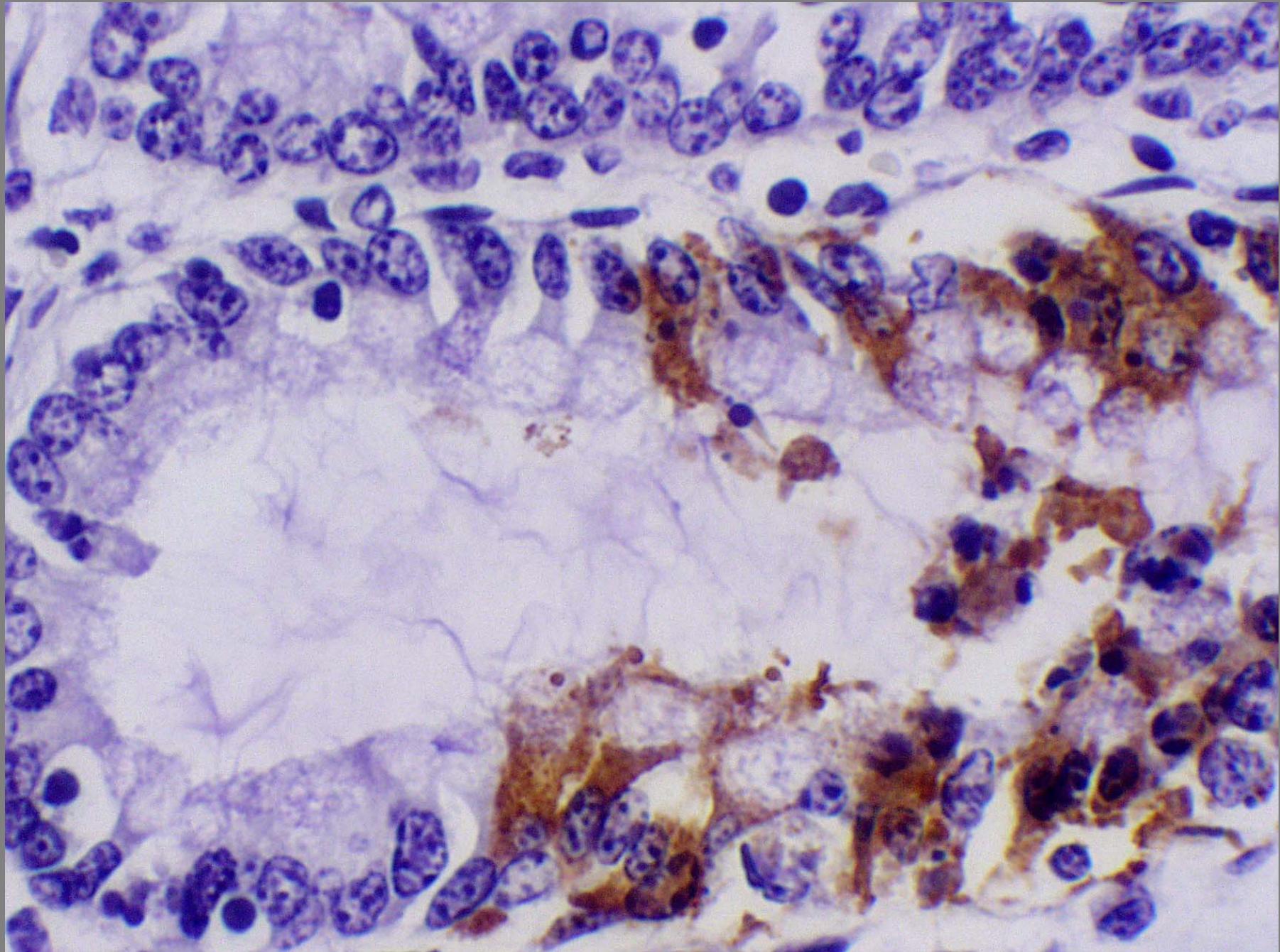
Sm intestine villus – colostrum in enterocytes (and E.coli)



Sm intestine villus – colostrum in enterocytes (and *E.coli*)



Small intestine – rotavirus in apical enterocytes



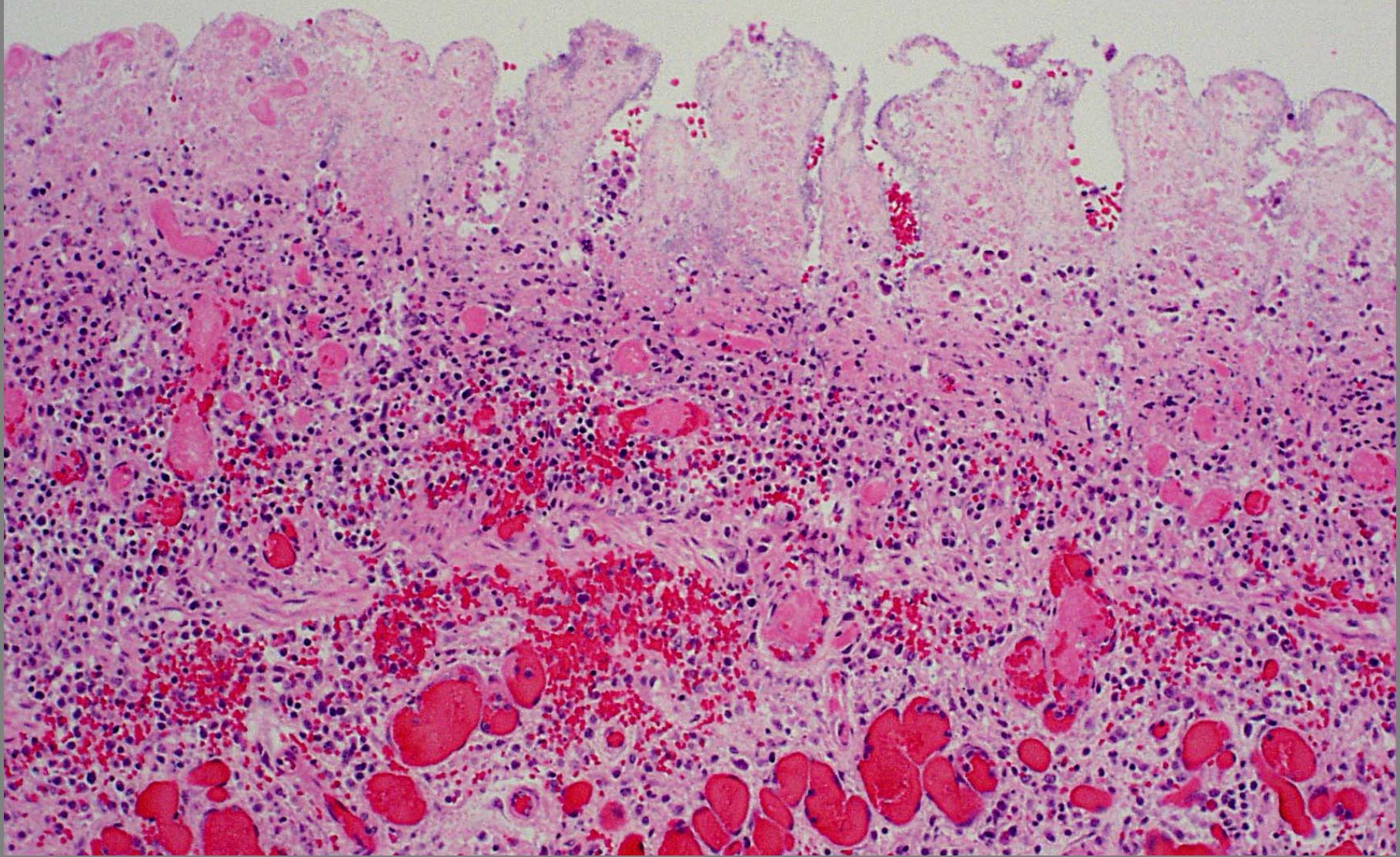
Large intestine – coronavirus in crypt enterocytes



Calf – fibrinonecrotic (diphtheritic) subacute to chronic enterotyphlocolitis with casts and lymphadenitis - *Salmonella enterica dublin* – 24 Dec 2005



Calf – fibrinonecrotic (diphtheritic) subacute to chronic
enterotyphlocolitis with casts and lymphadenitis - *Salmonella*
enterica dublin – 24 Dec 2005



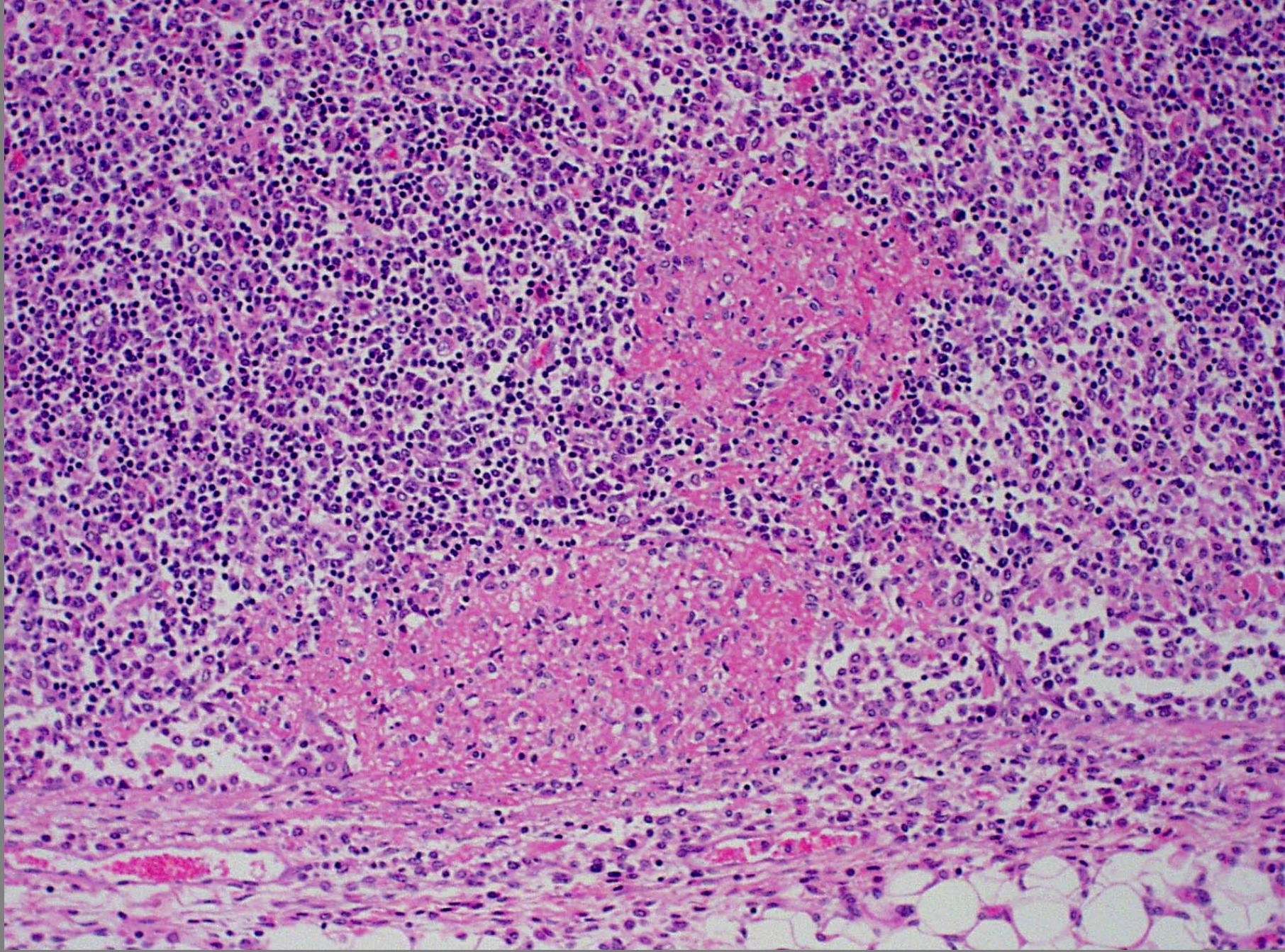
Small intestine – necrotizing enteritis with thrombi
Salmonella



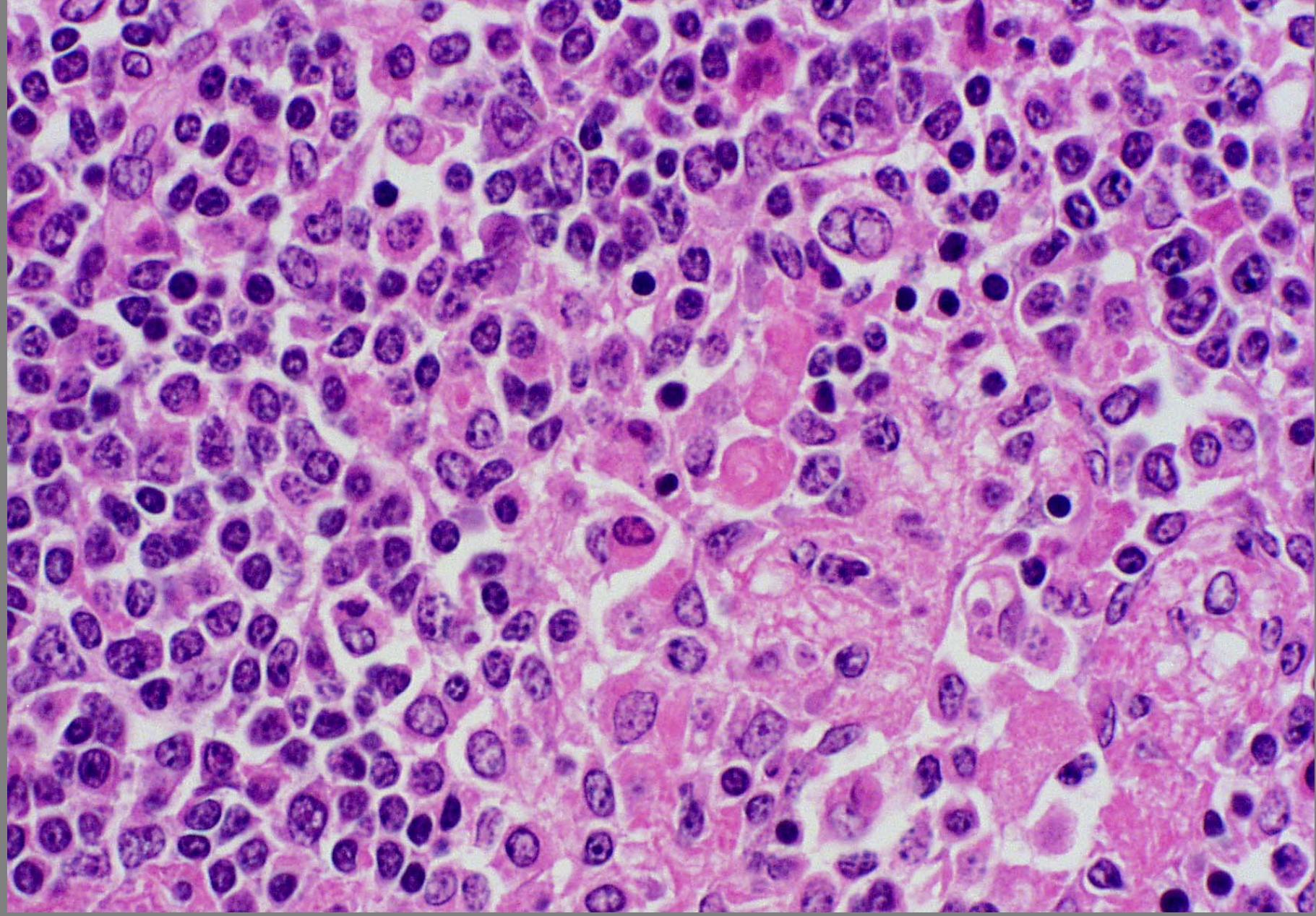
Sm intestine – fibrinous necrotizing (diphtheritic) enteritis –
BVD pestivirus and *Salmonella enterica*



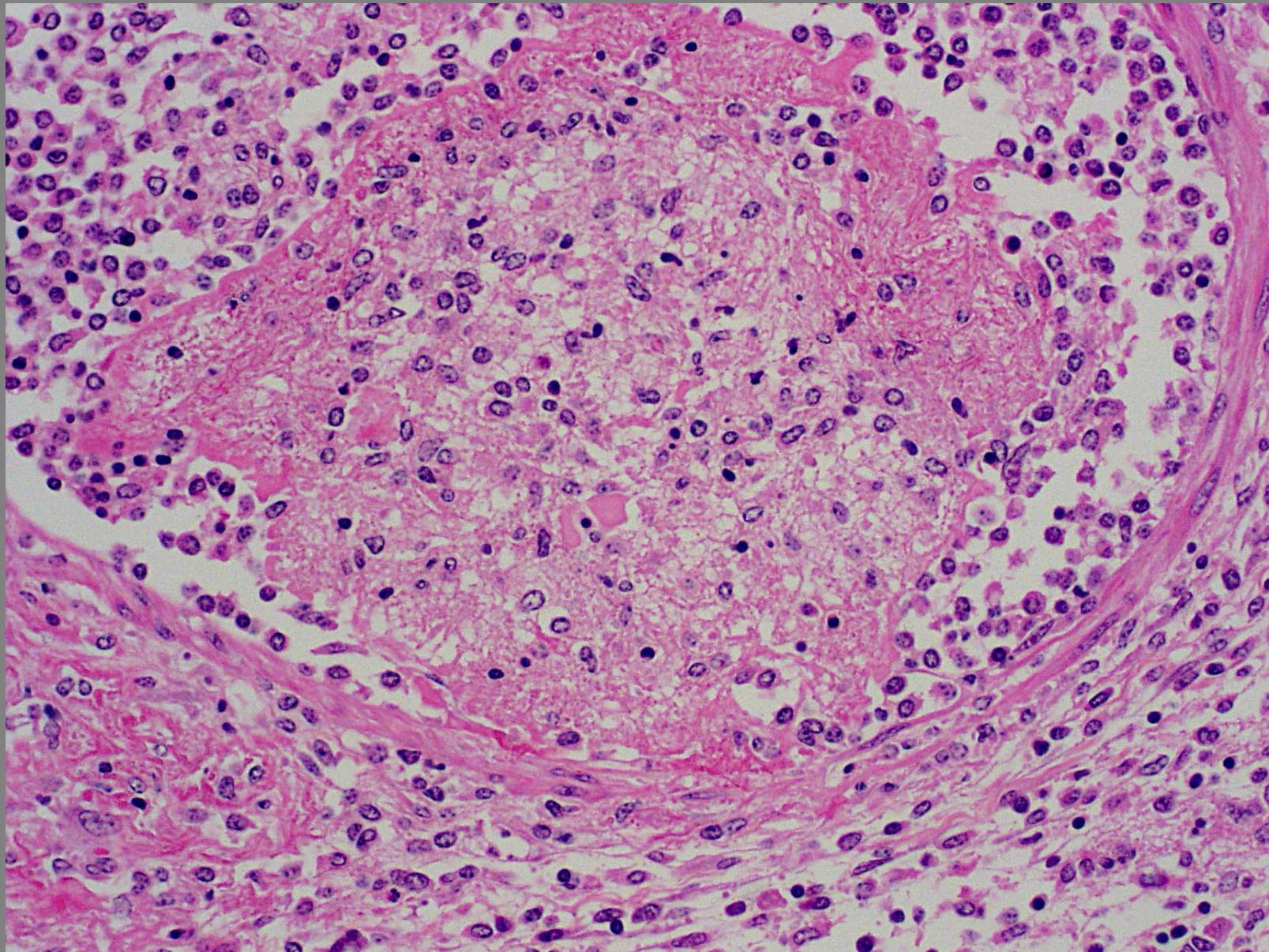
Sm intestine – Payer's patch necrosis *Salmonella enterica*
(in S.Africa this is classic MCF – Dr. Jardine personal comm.)



Mesenteric lymph node – necrosis - *Salmonella enterica*



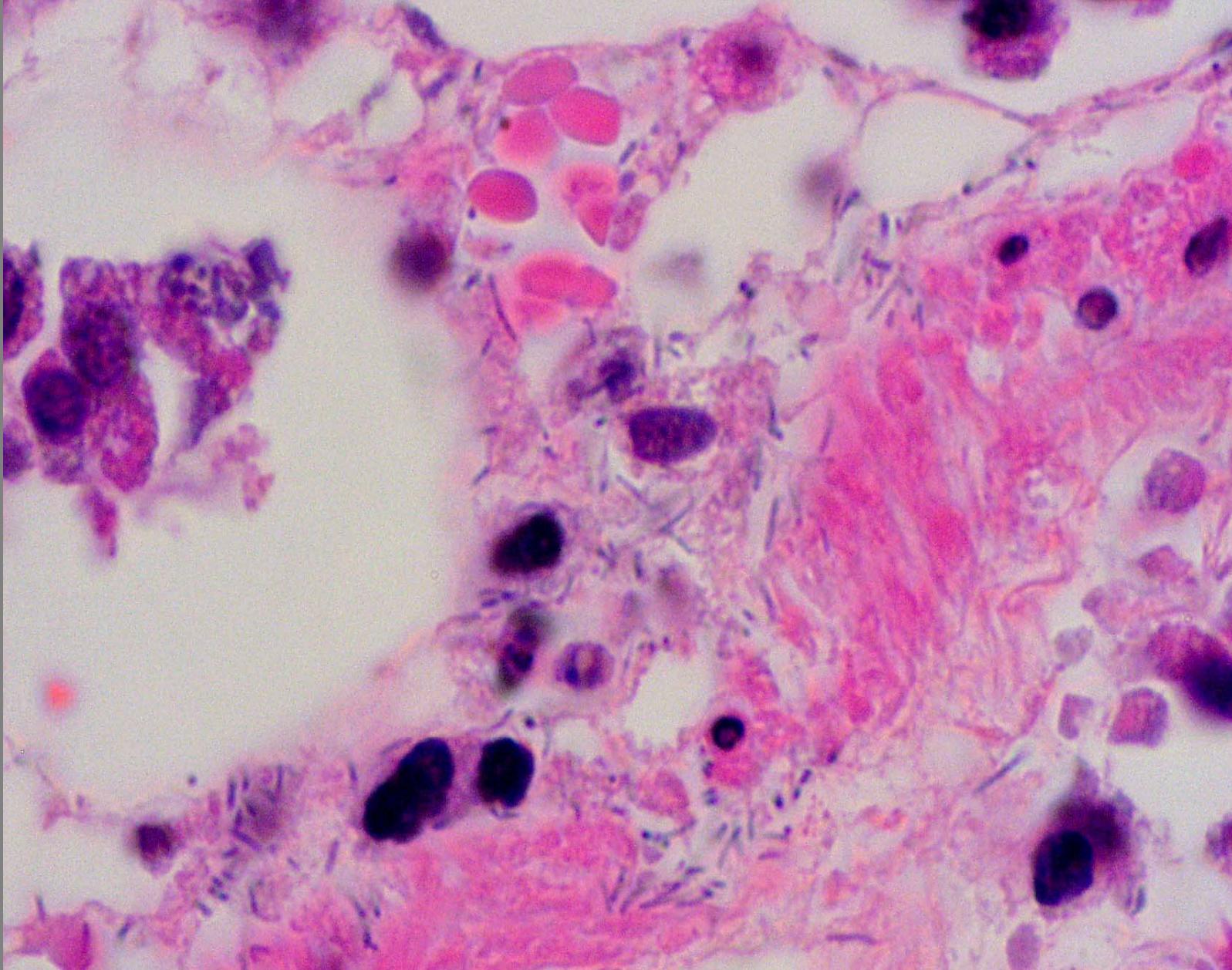
Mesenteric lymph node – reactive with fibrin - *Salmonella enterica*



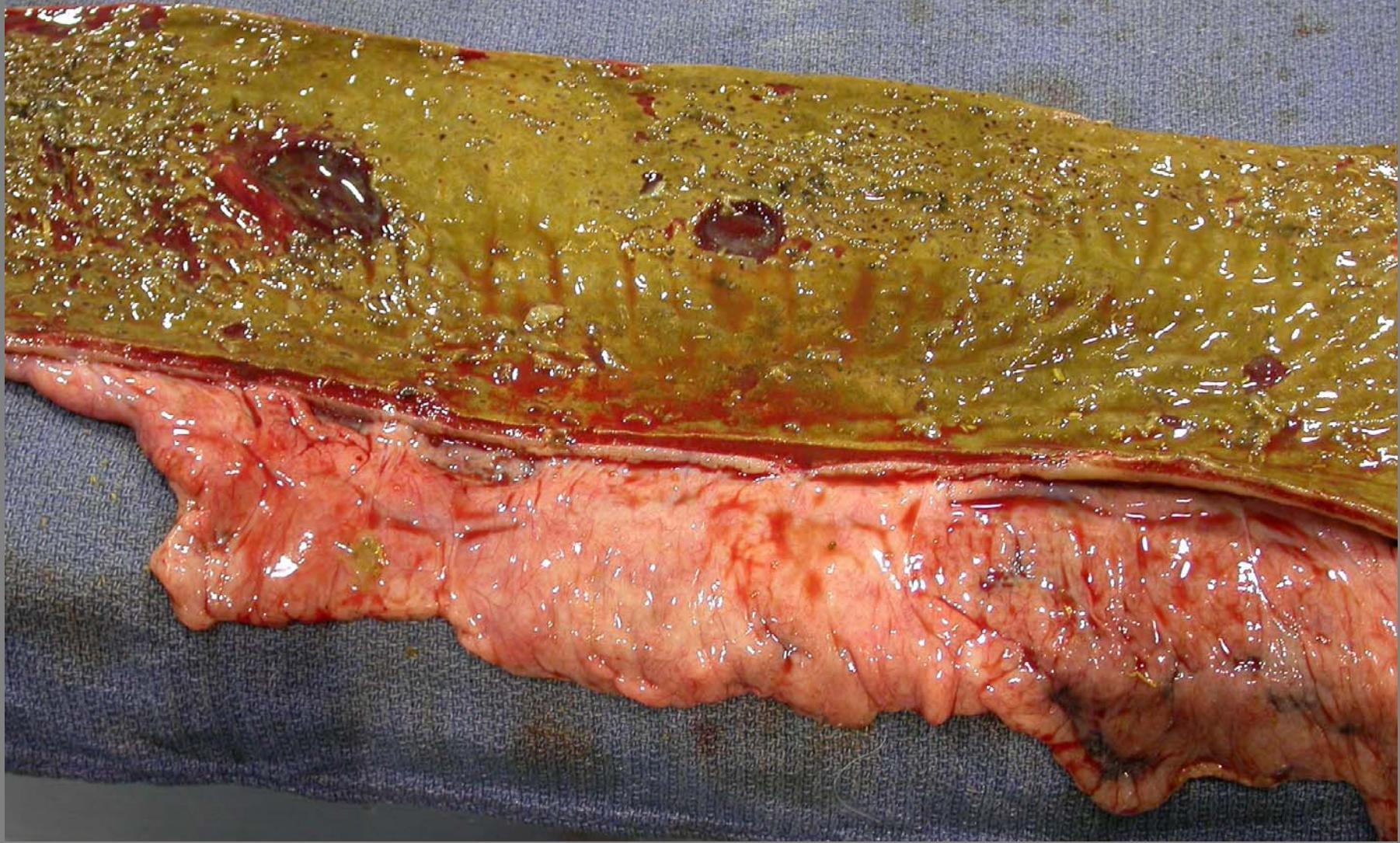
Mesenteric lymph node – lymphangitis and fibrin thrombus -
Salmonella enterica



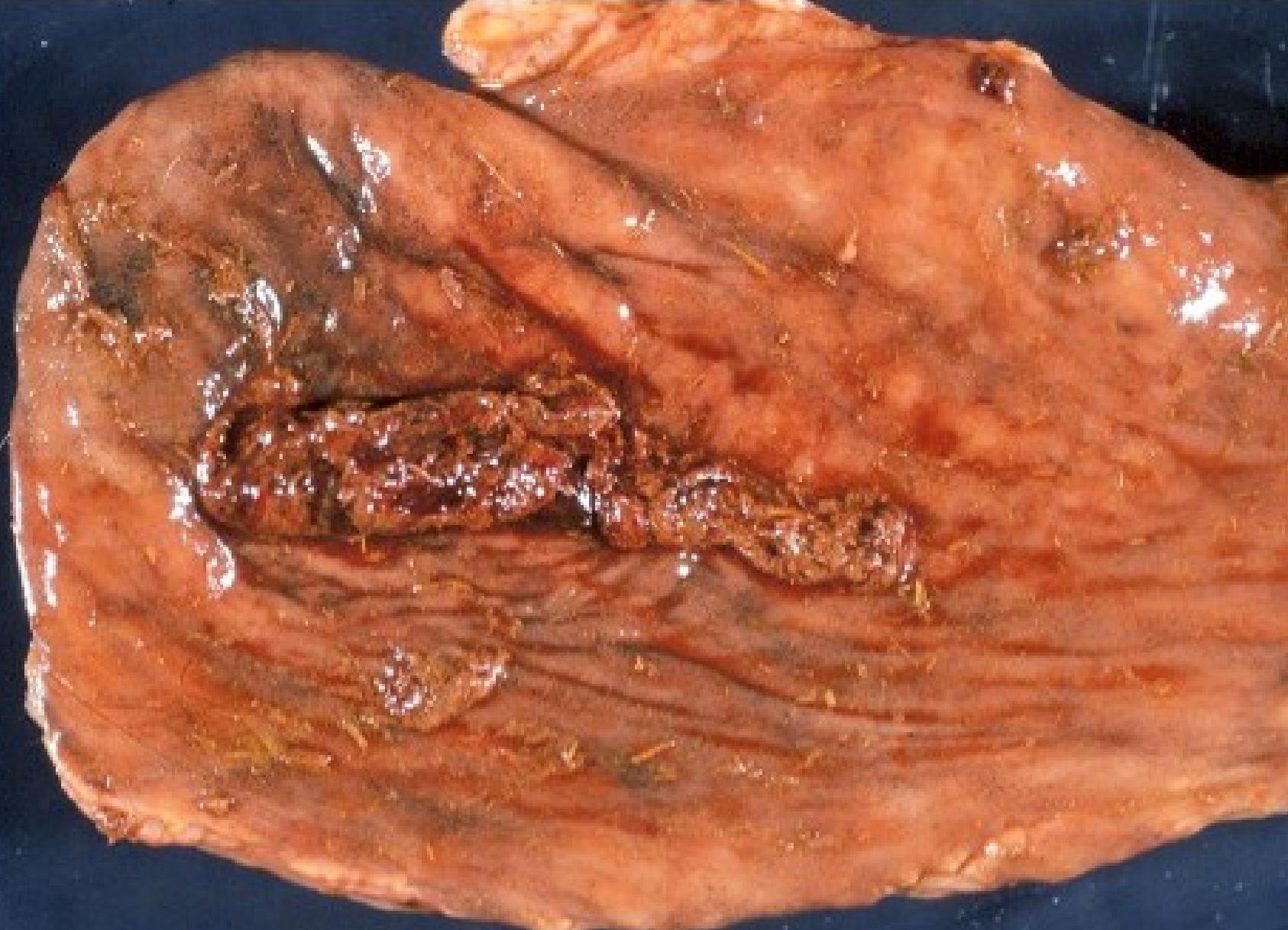
Small intestine – acute hemorrhagic necrotic and fibrinous enteritis – *Clostridium spp.*



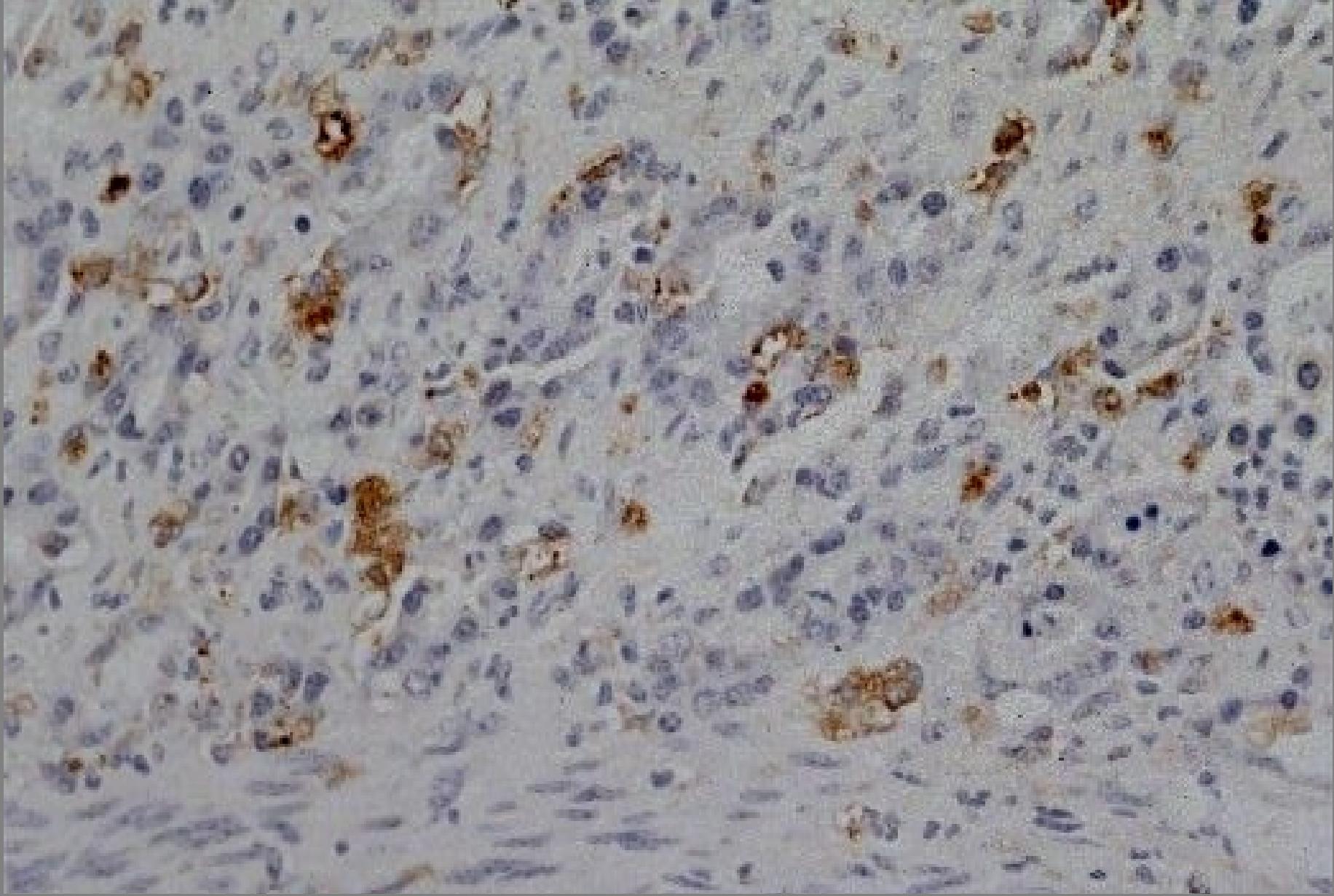
Small intestine – acute hemorrhagic necrotic and fibrinous enteritis – *Clostridium spp.*



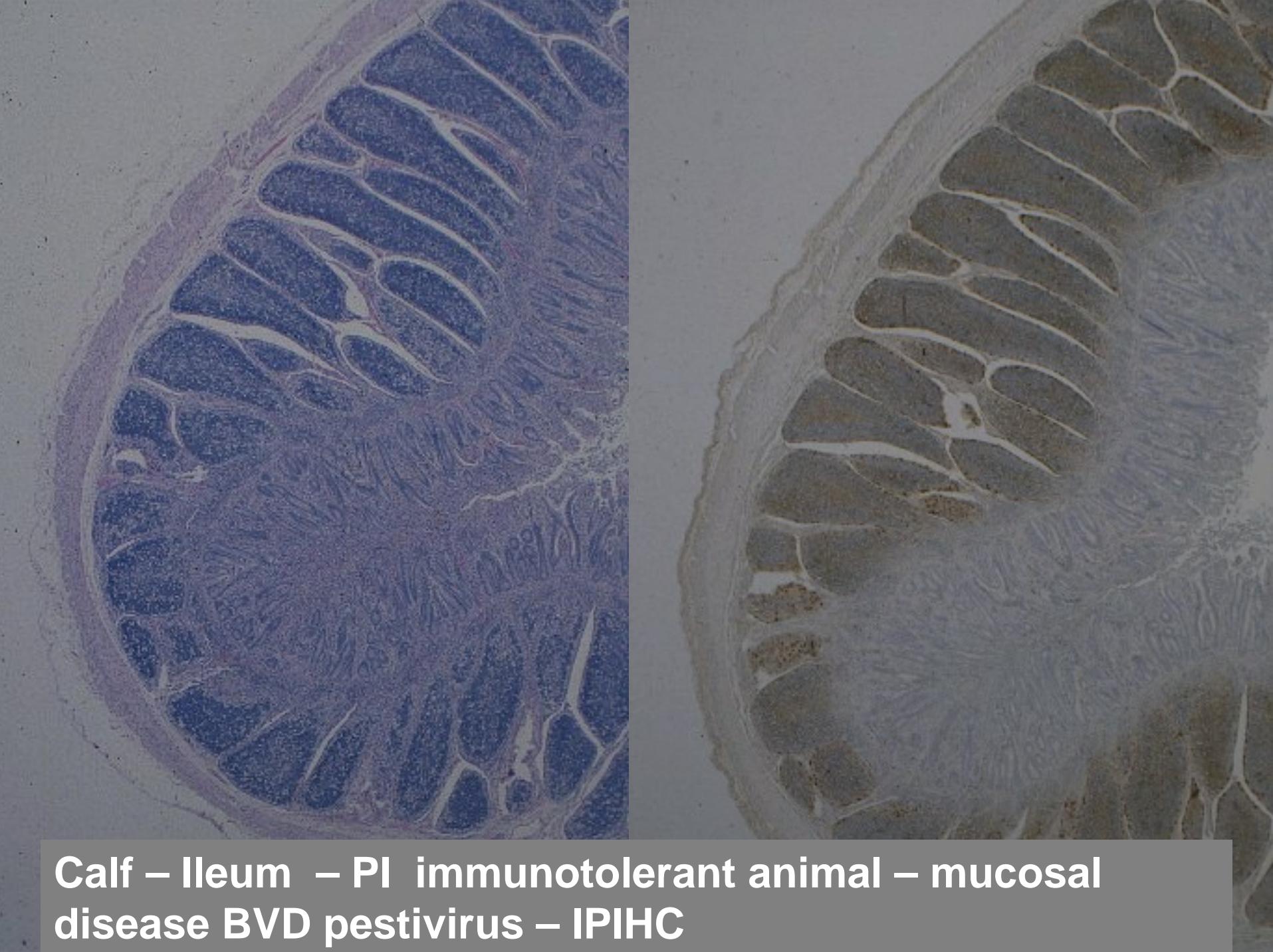
Alpaca – subacute necrotic and fibrinous (diphtheritic enterotyphlocolitis) – *Salmonella* spp. + *Clostridium* spp.



Cecum – fibrinous and necrotizing typhlitis with intraluminal cast - mucosal disease – BVD pestivirus



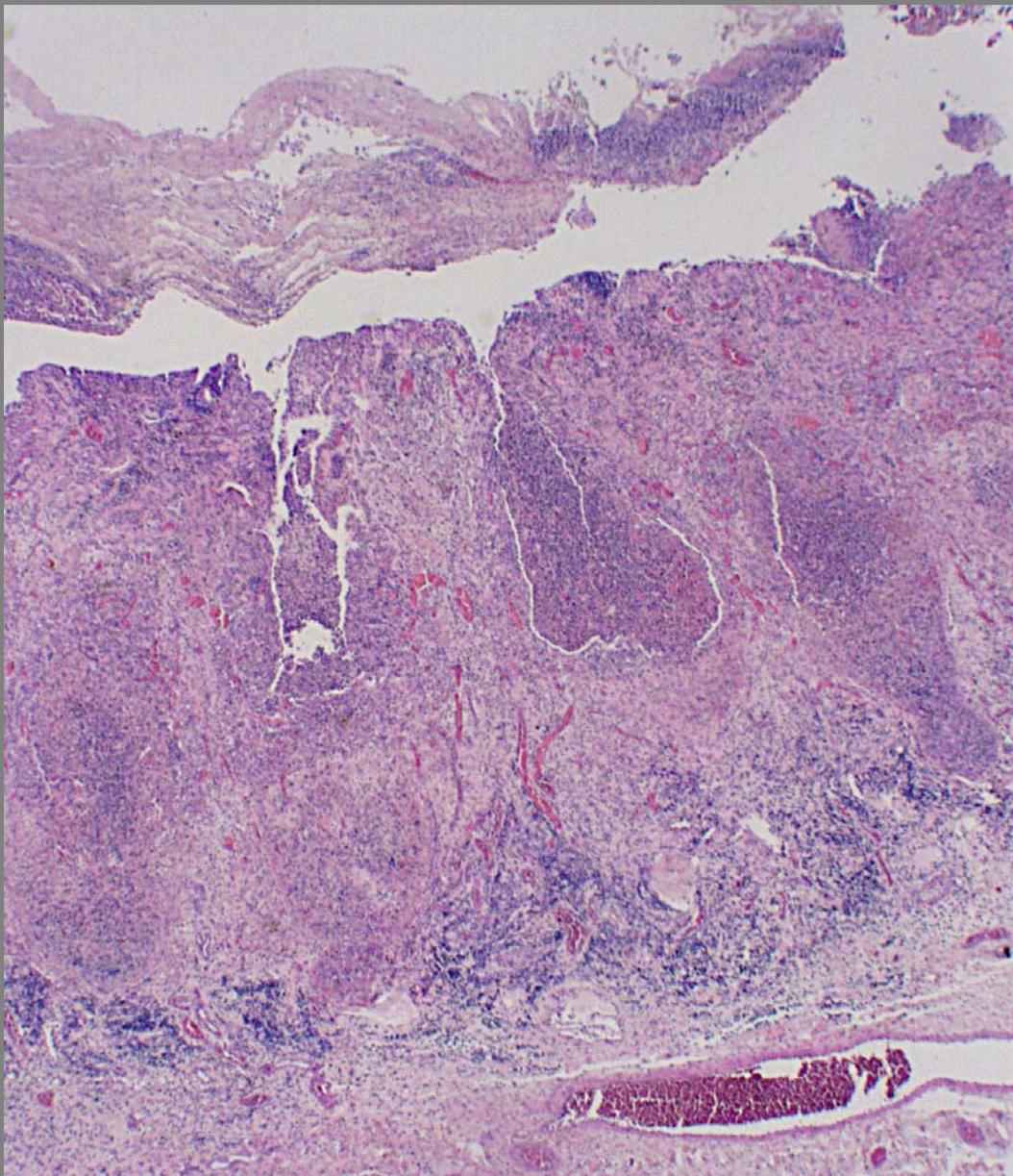
**Intestine - crypt necrosis - mucosal disease – BVD
pestivirus- IPIHC**



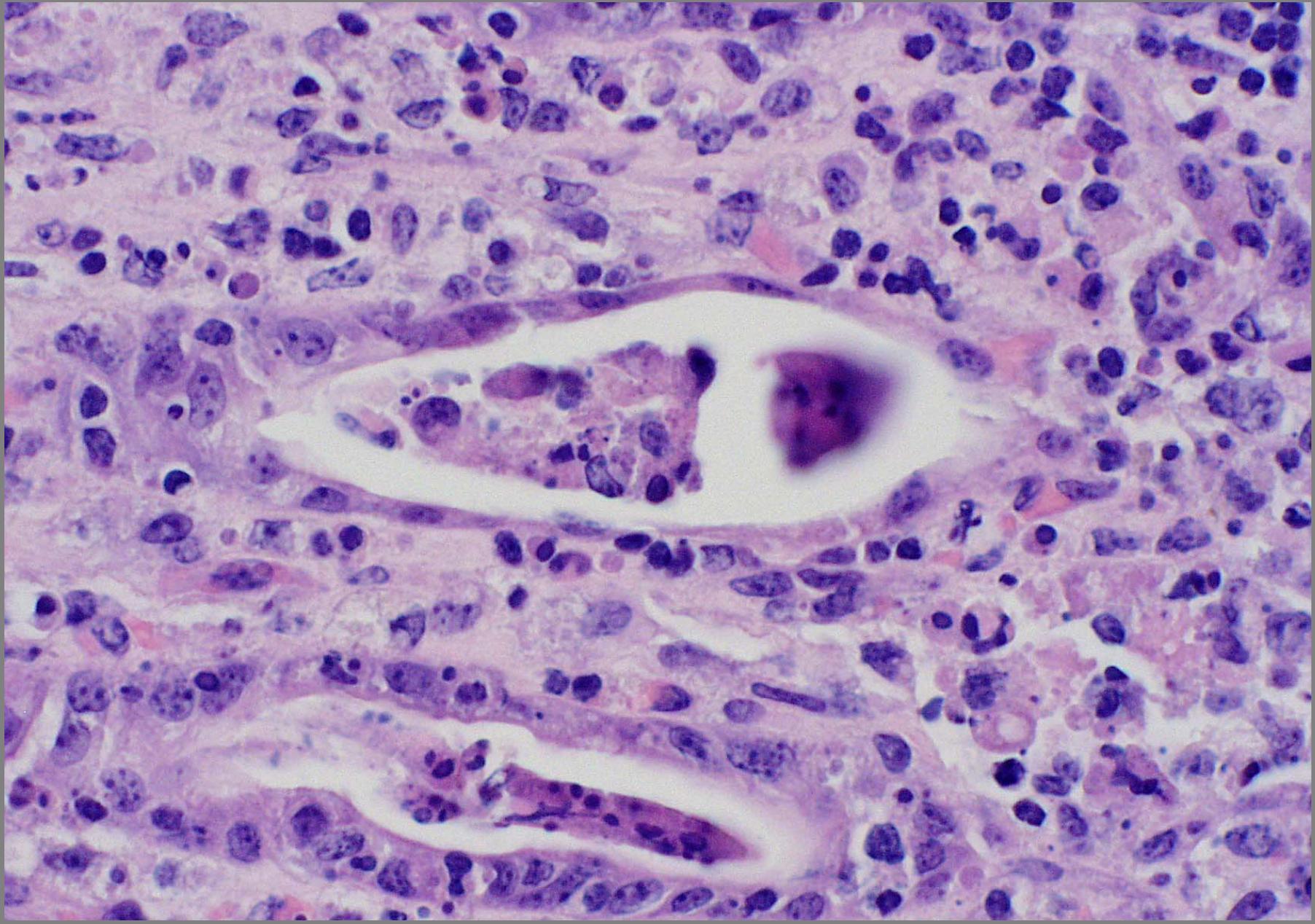
**Calf – Ileum – PI immunotolerant animal – mucosal
disease BVD pestivirus – IPIHC**



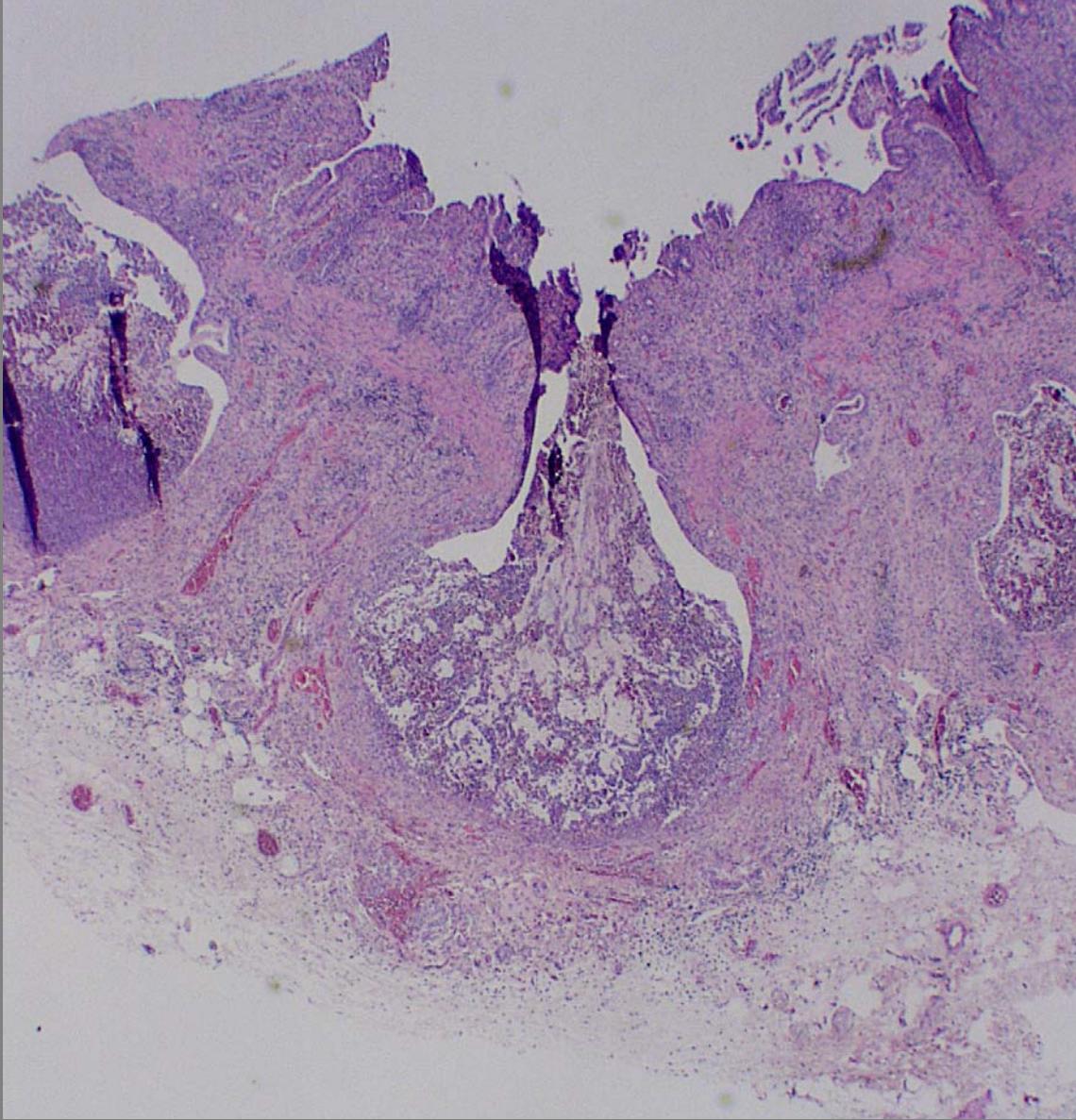
Cecum – fibrinonecrotic enterophyllosis (diphtheritic)
– rinderpest morbillivirus



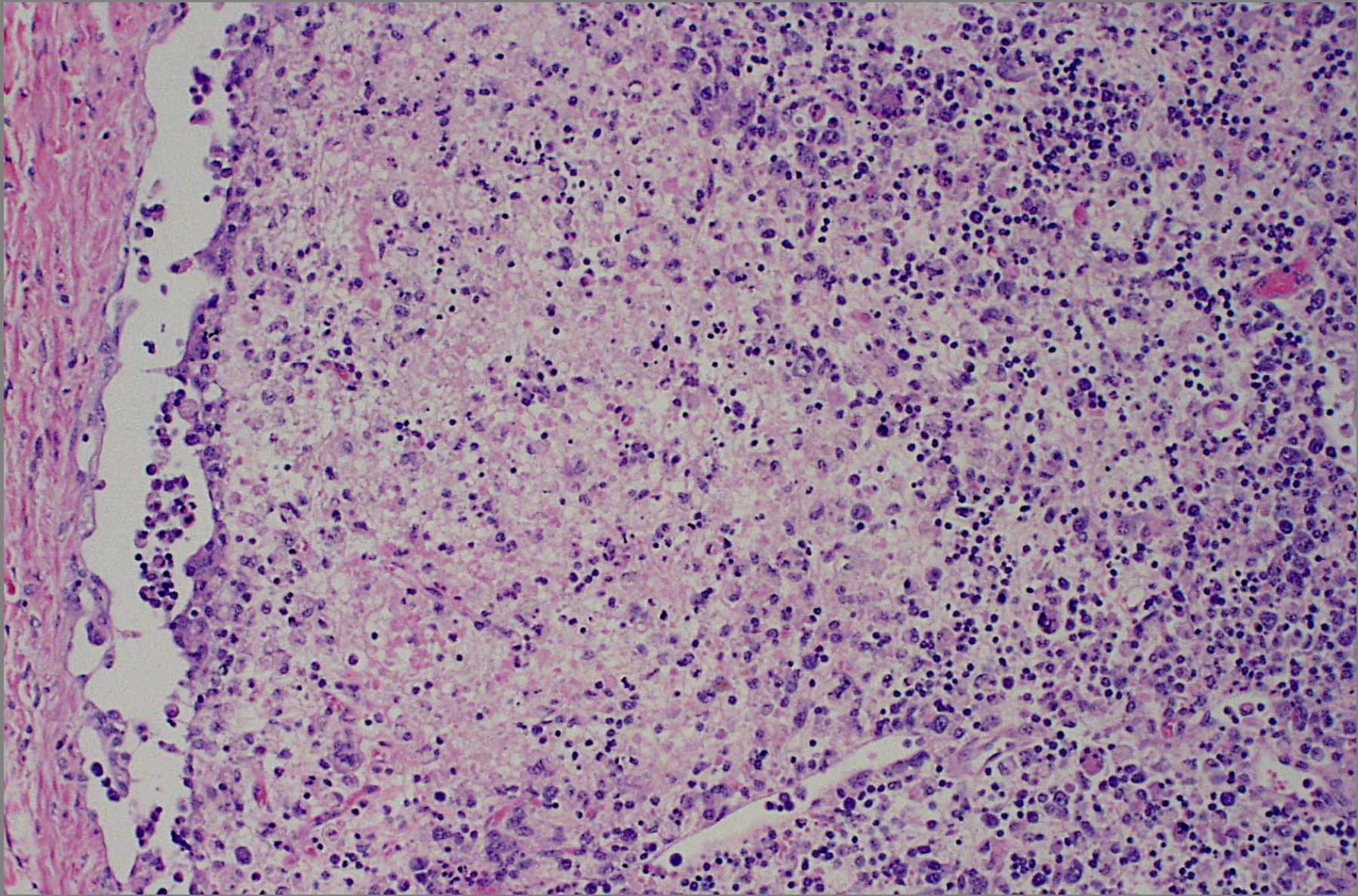
**Cecum – fibrinonecrotic enterophyllocolitis (diphtheritic)
– rinderpest morbillivirus**



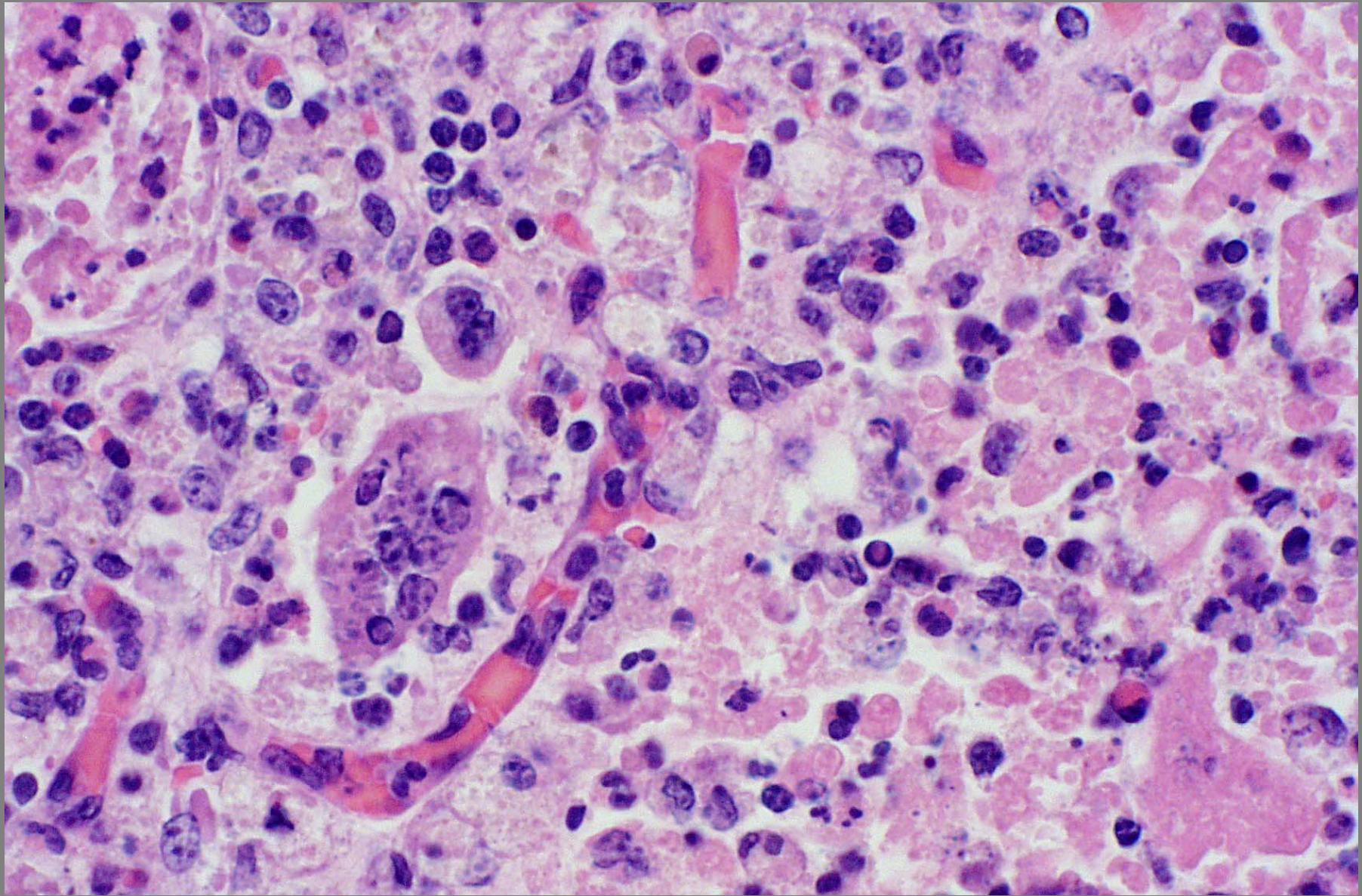
**Intestine – fibrinonecrotic enteritis
(diphtheritic) – crypt necrosis – rinderpest morbillivirus**



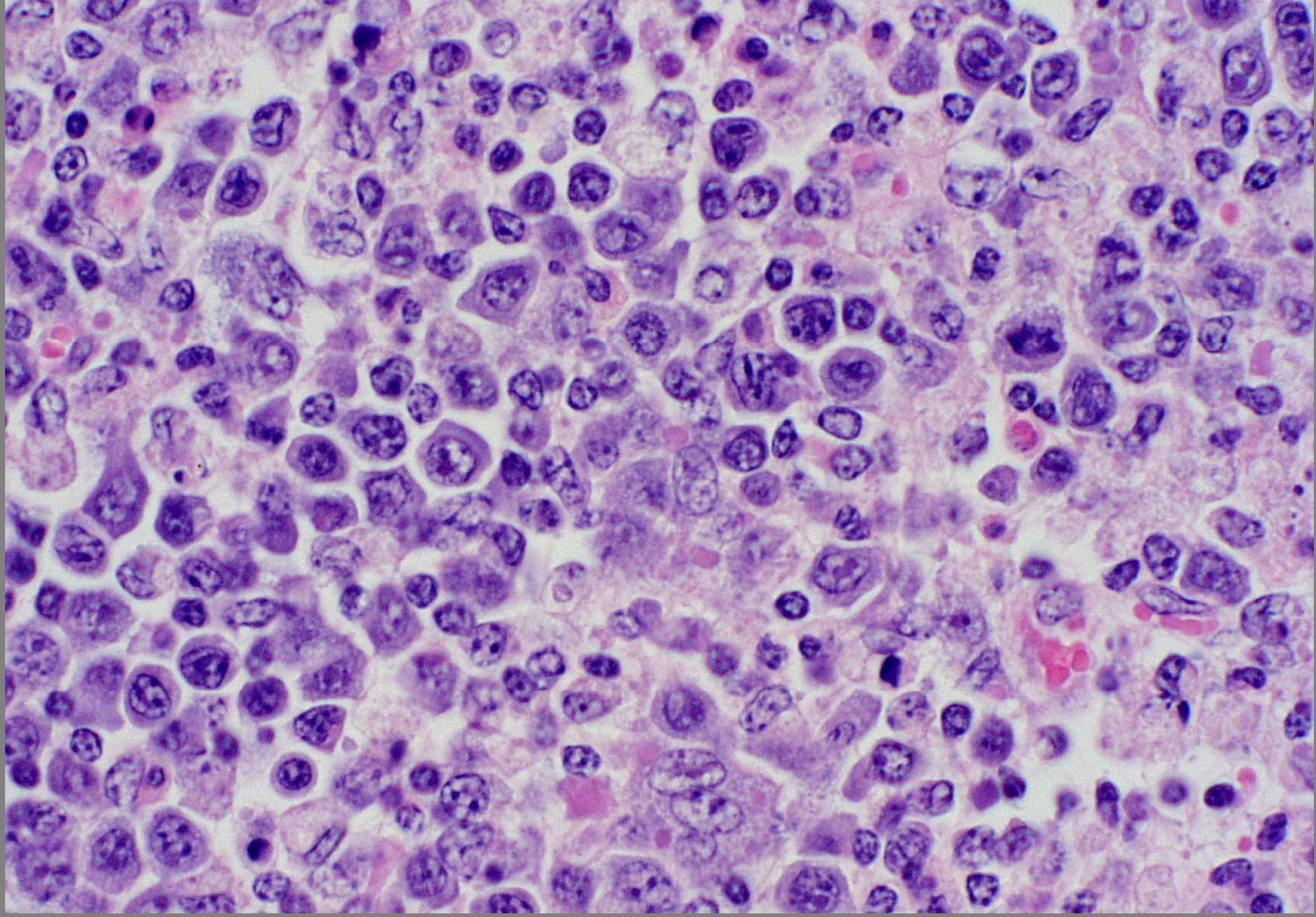
**Intestine – fibrinonecrotic enterophyllocolitis
(diphtheritic) – post necrotic patch collapse – rinderpest
morbillivirus**



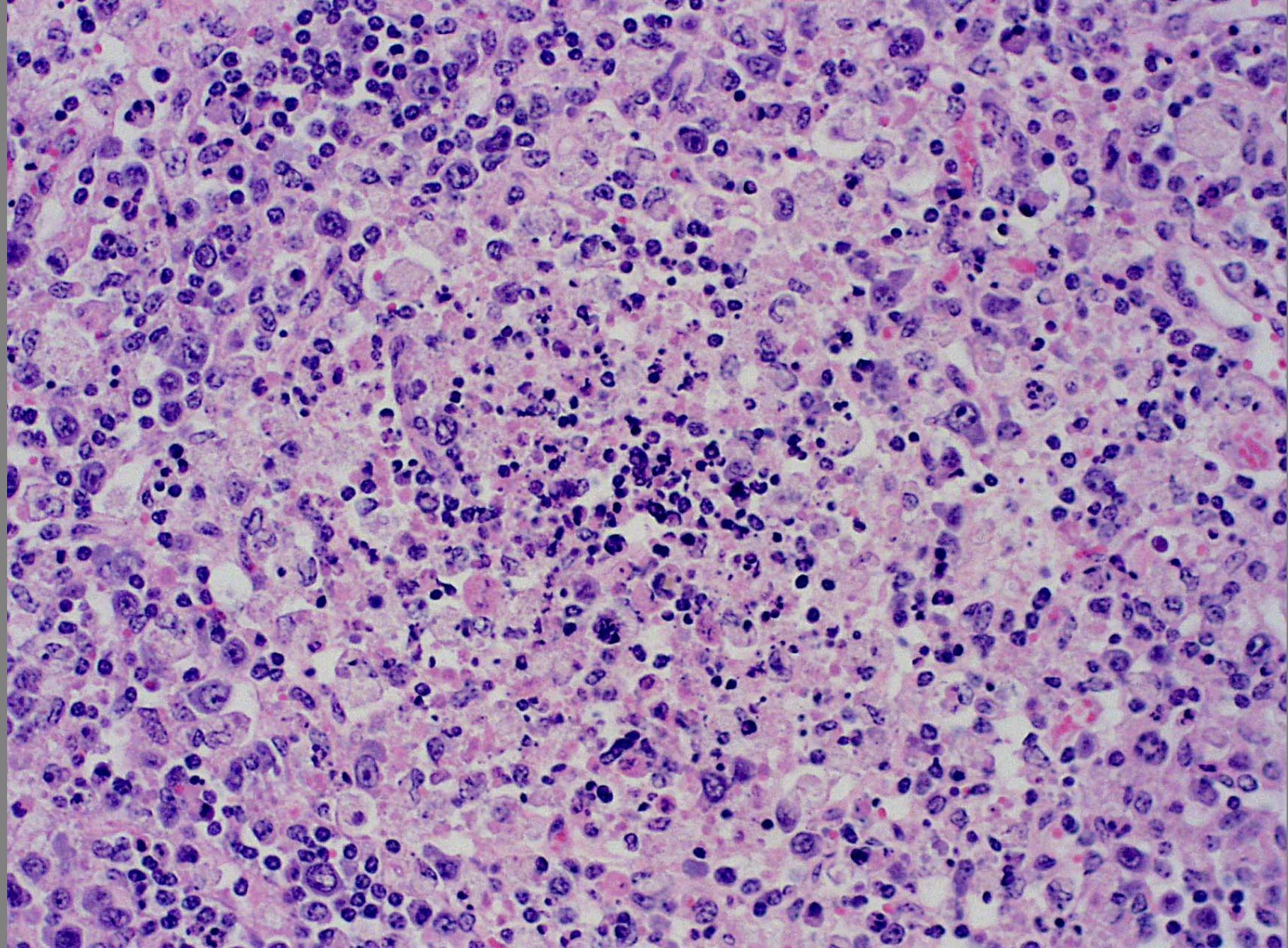
**Intestine – fibrinonecrotic enterophyllocolitis (diphtheritic) –
post necrotic patch collapse – macrophages, syncytia,
necrosis – rinderpest morbillivirus**



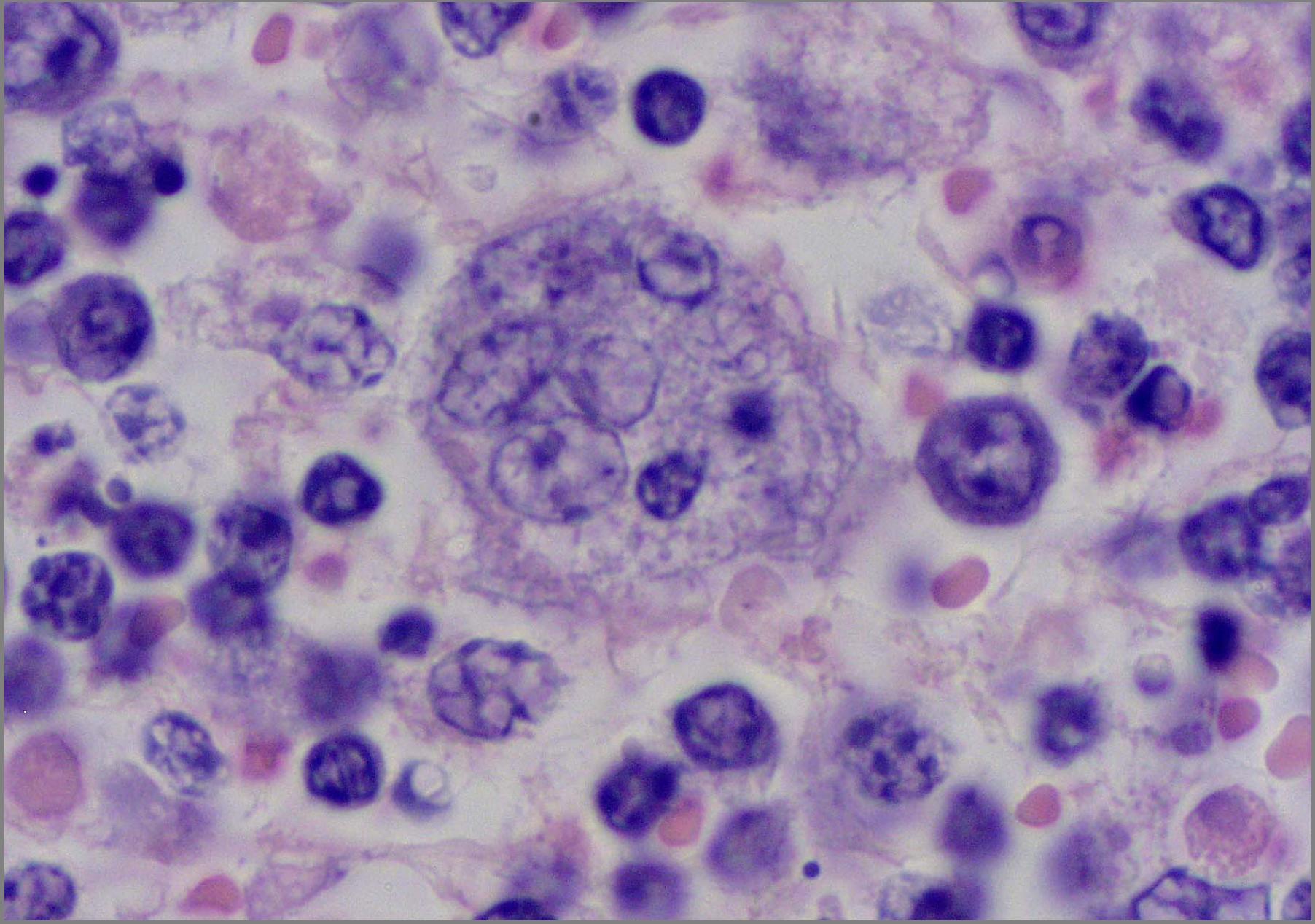
**Intestine – fibrinonecrotic enterophyllocolitis (diphtheritic) –
post necrotic patch collapse – macrophages, syncytia,
necrosis – rinderpest morbillivirus**



Mesenteric lymph node – reactive with blasts – single cell death – rinderpest morbillivirus



Mesenteric lymph node – necrosis – rinderpest morbillivirus



Mesenteric lymph node – reactive with syncytia – rinderpest morbillivirus



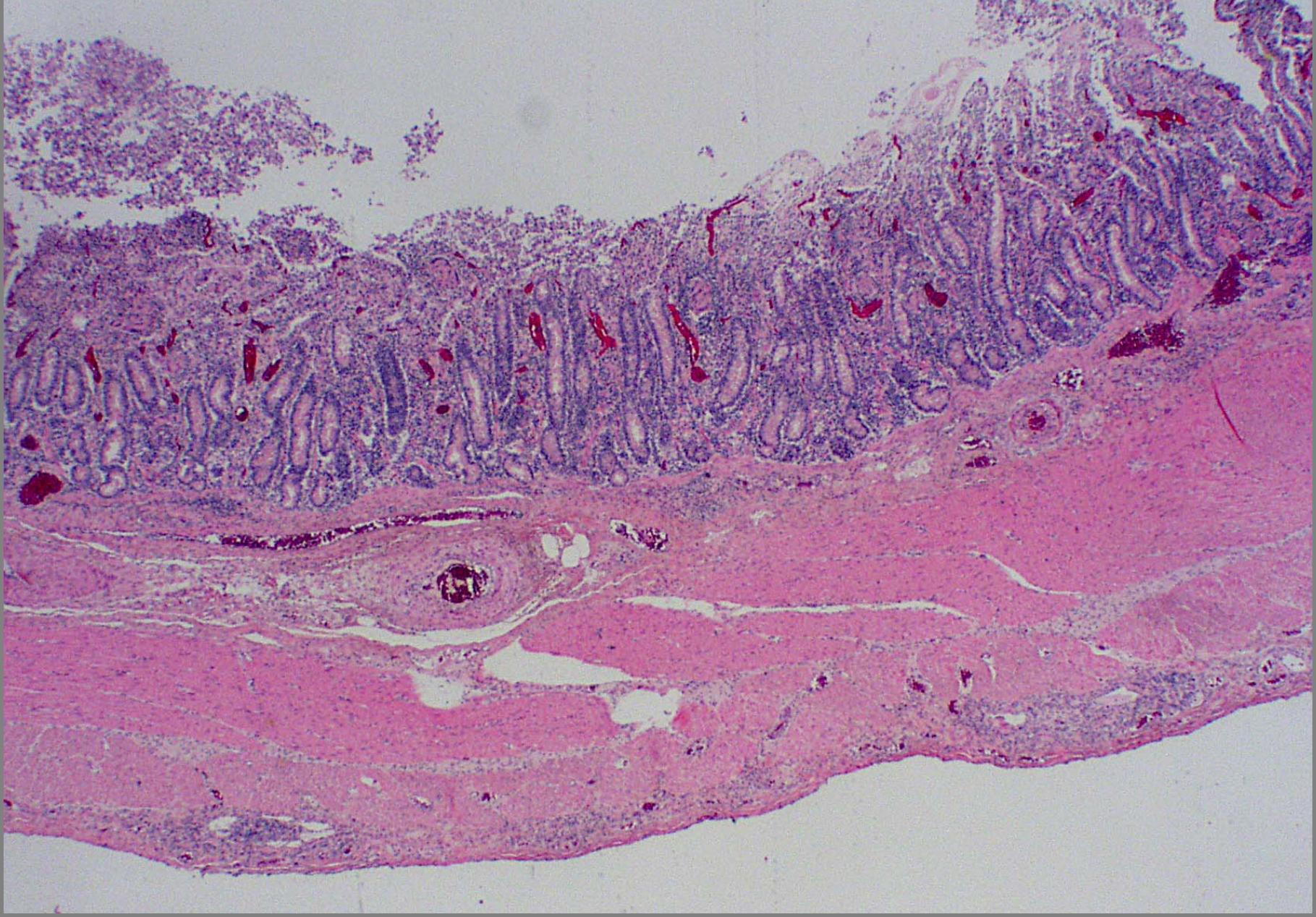
Distal colon tiger stripe hemorrhage – DD: agony, BVDV – rinderpest morbillivirus



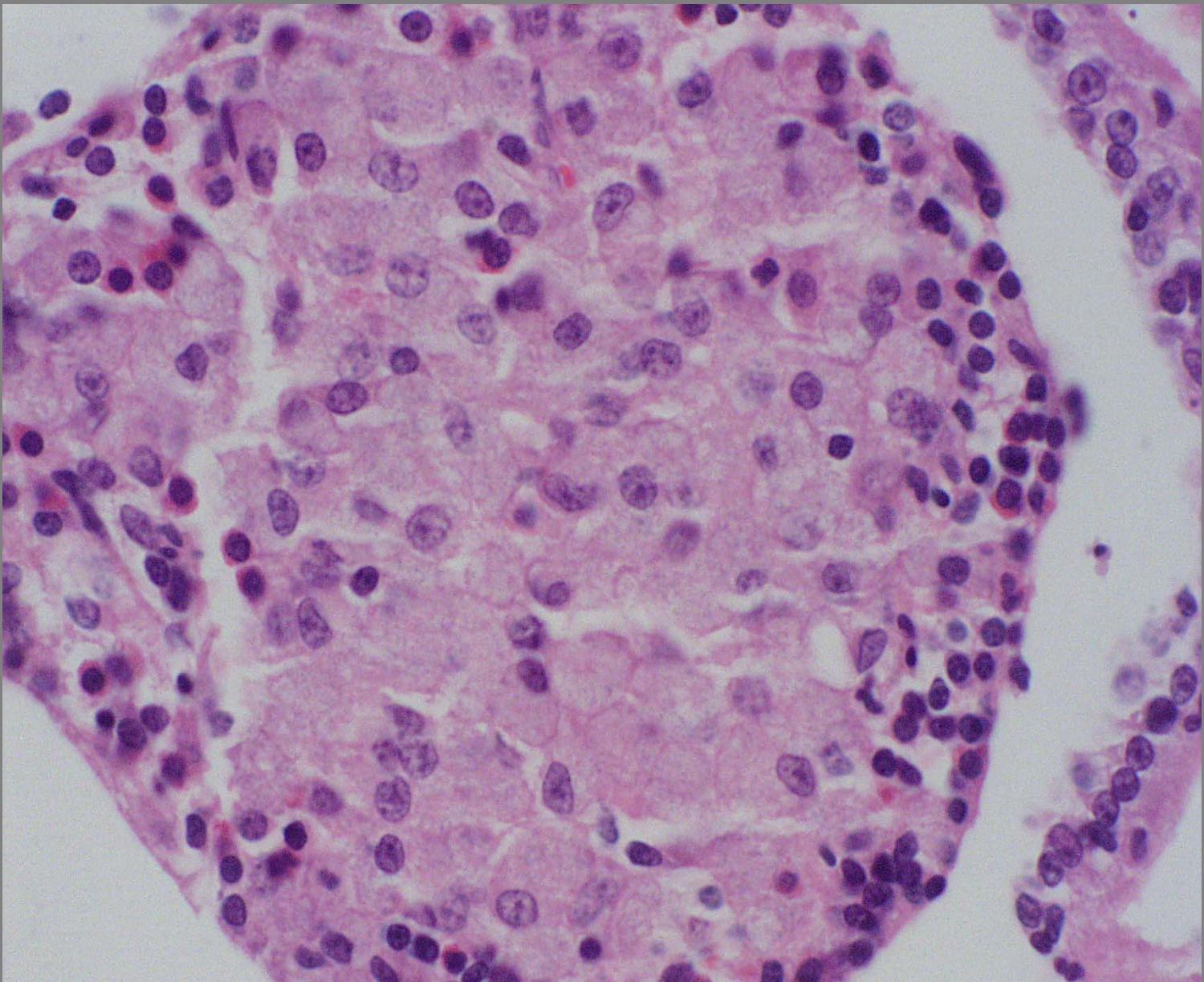
**Intestine – granulomatous enterophyllocolitis,
lymphadenitis, lymphangitis and serous atrophy of fat –
paratuberculosis – *Mycobacterium avium paratuberculosis***



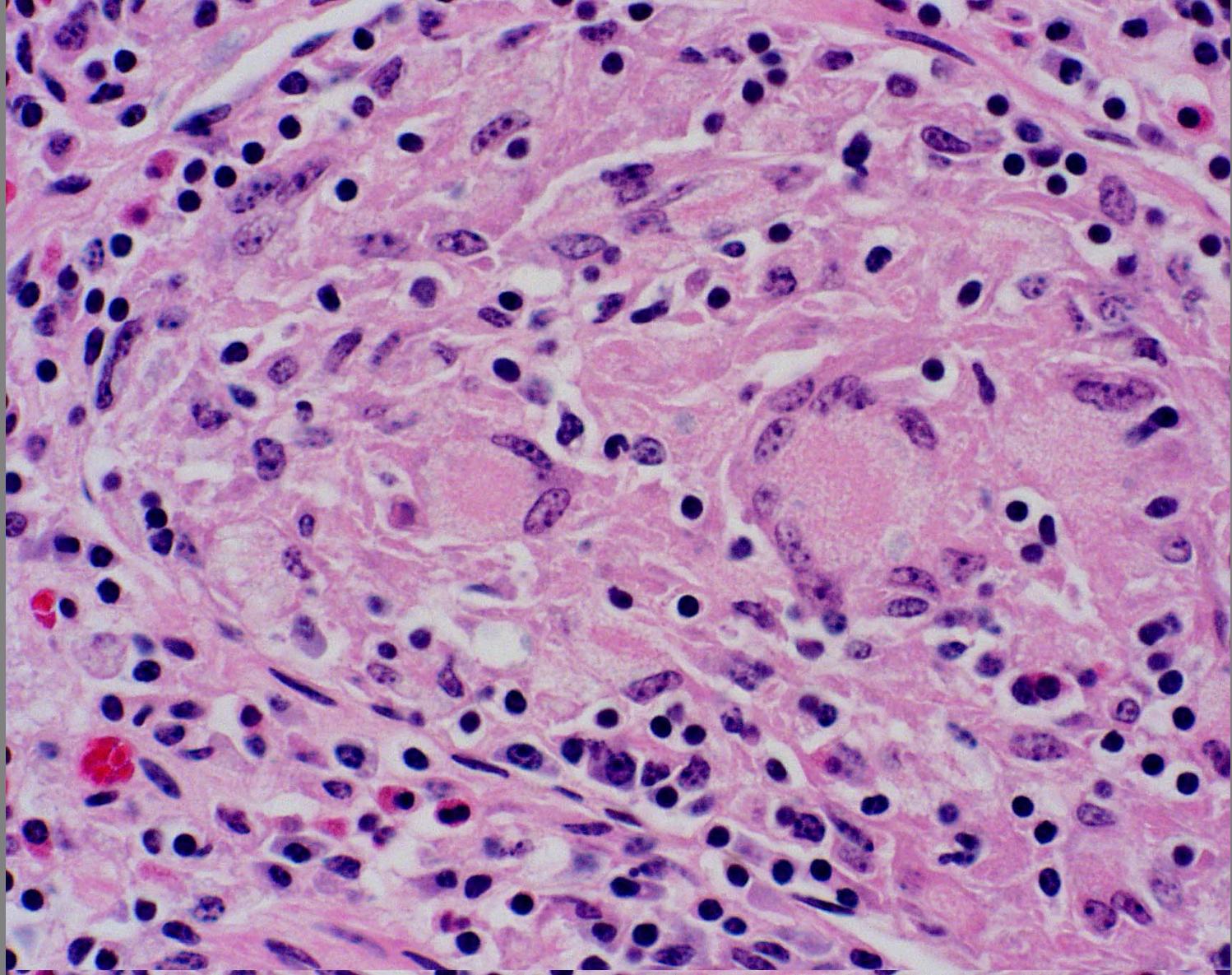
Intestine – granulomatous enterotyphlocolitis, lymphadenitis
– paratuberculosis – *Mycobacterium avium paratuberculosis*



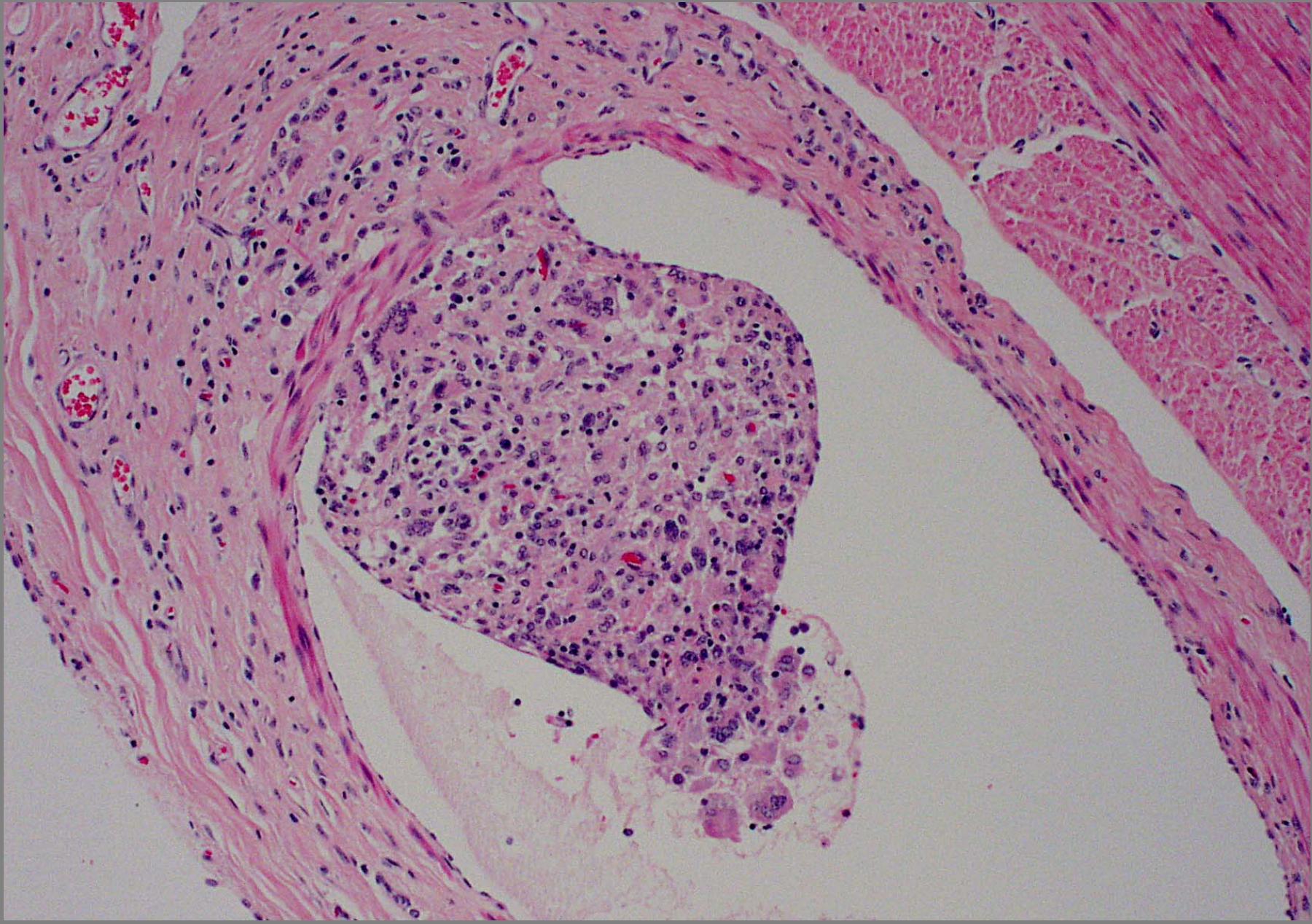
Intestine – granulomatous enteropathy, lymphangitis
– paratuberculosis – *Mycobacterium avium paratuberculosis*



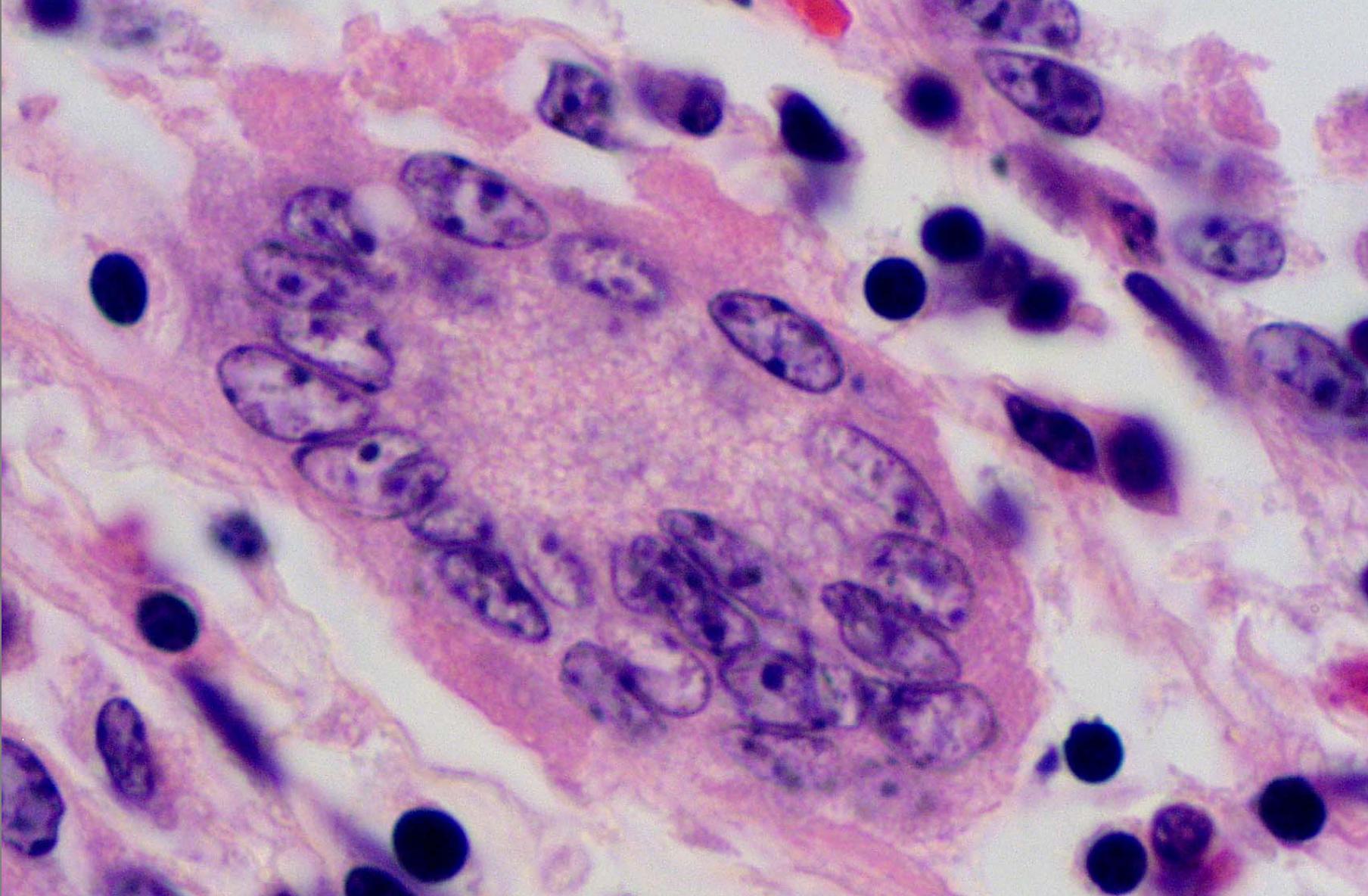
Intestine – granulomatous enterophyllocolitis – villus cross section – *Mycobacterium avium paratuberculosis*



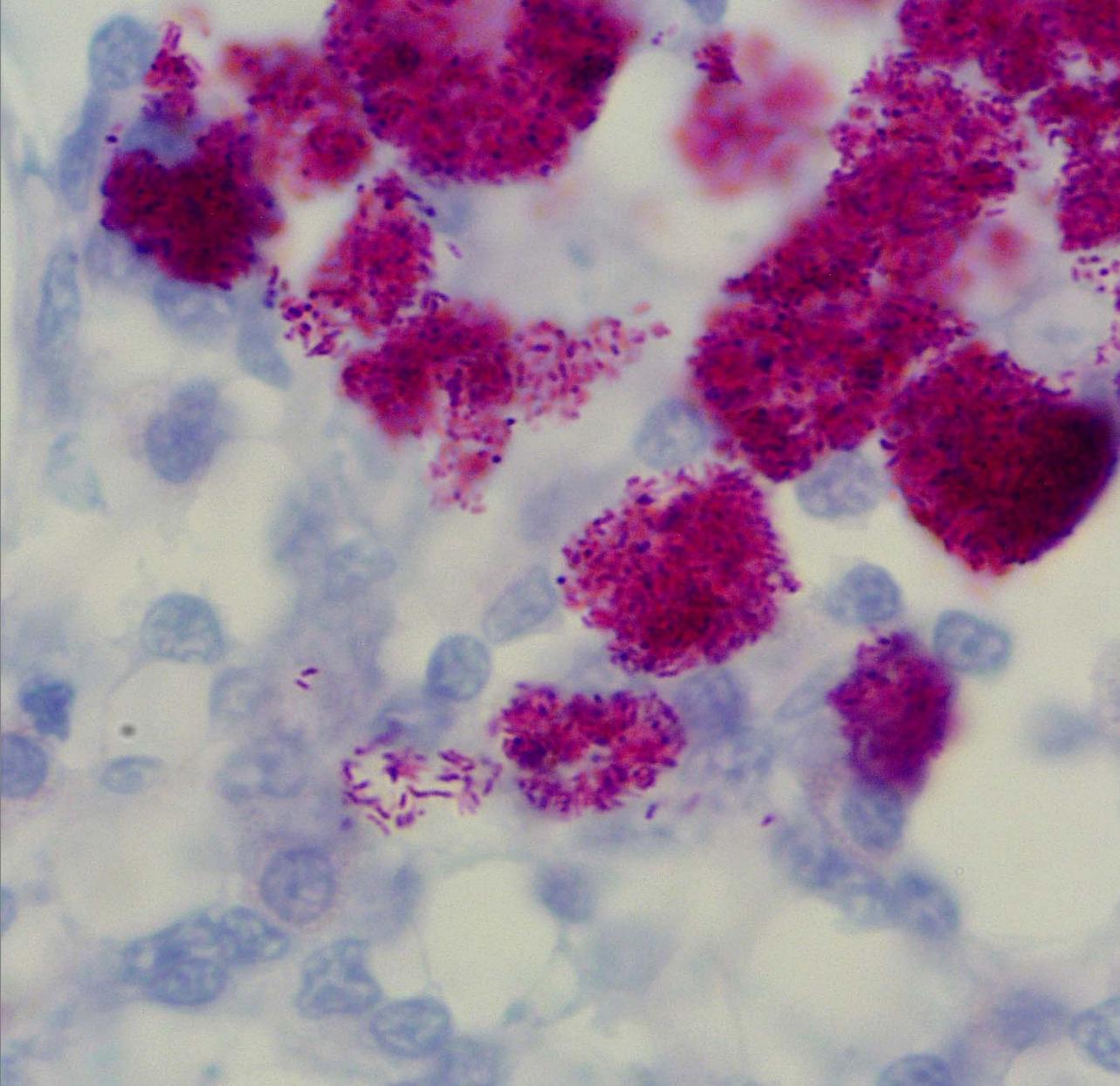
Intestine – granulomatous enterophyllocolitis with
multinucleated Langhans cells – paratuberculosis –
Mycobacterium avium paratuberculosis



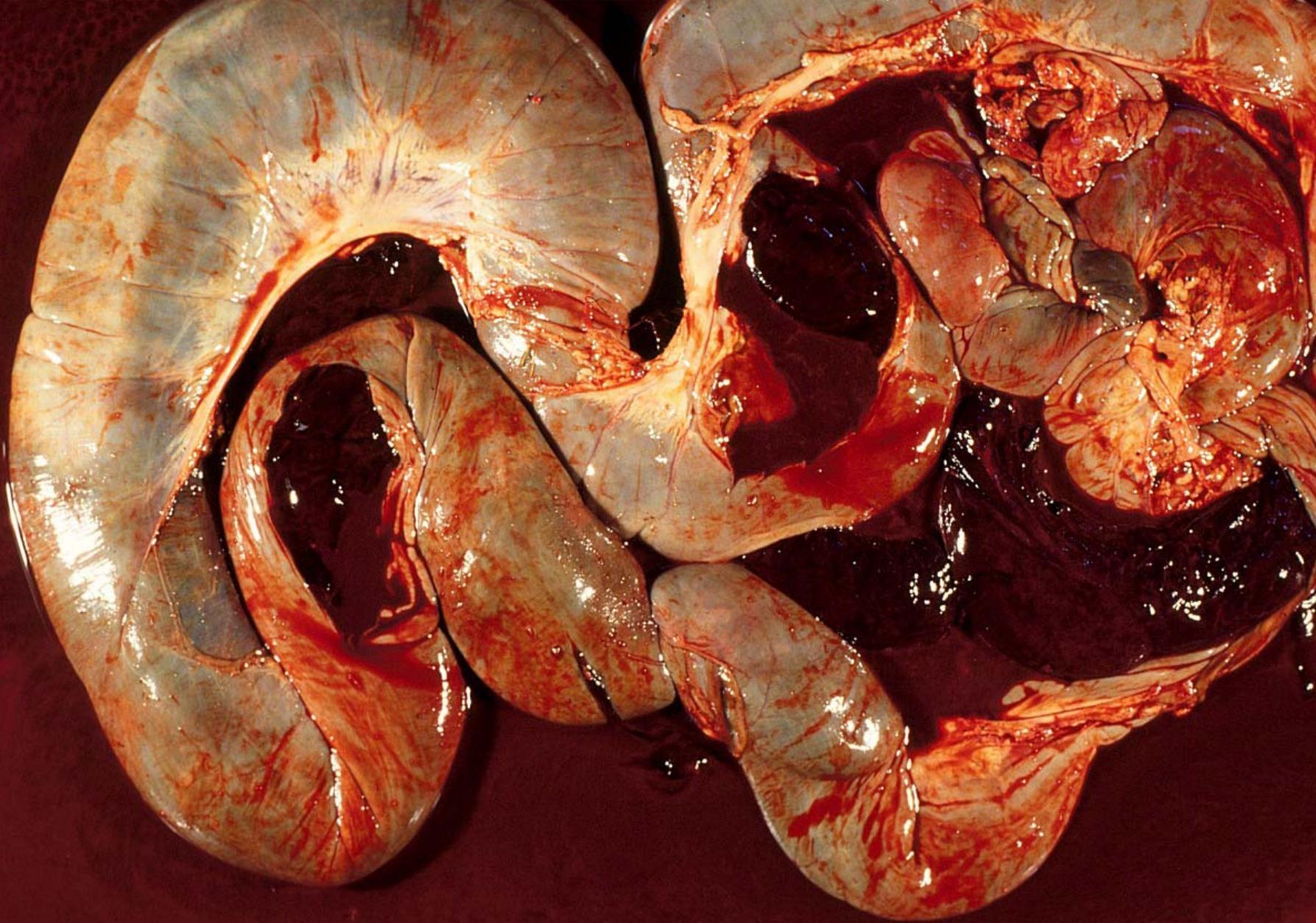
Intestine – granulomatous lymphangitis – paratuberculosis
– *Mycobacterium avium paratuberculosis*



Intestine – granulomatous lymphangitis – multinucleated
Langhans cell – paratuberculosis – *Mycobacterium avium*
paratuberculosis



Intestine – granulomatous enteritis – paratuberculosis –
Mycobacterium avium paratuberculosis – Ziehl Neelsen



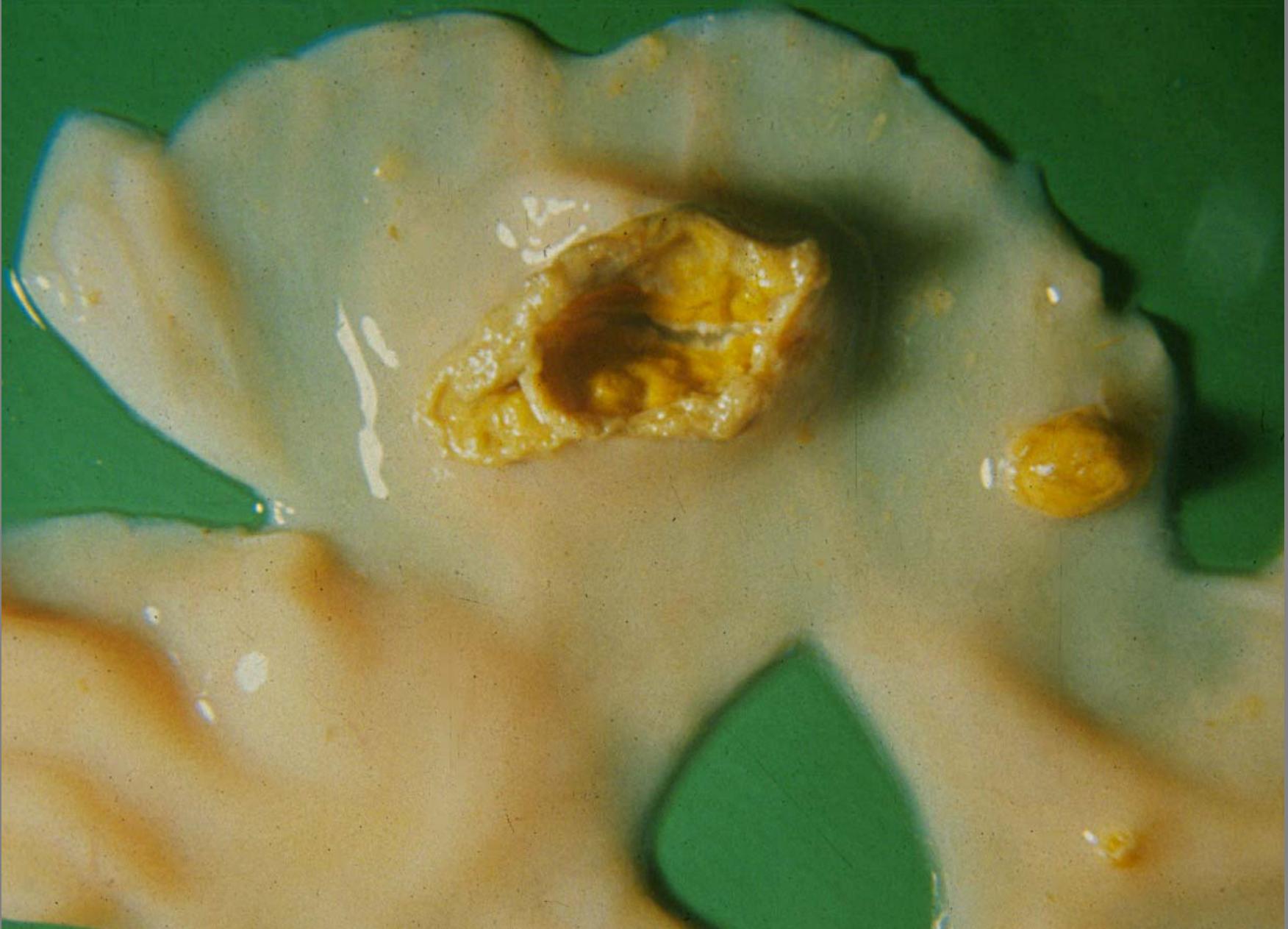
Jejunum – hemorrhagic syndrome – intraluminal hematoma – etiology unknown (not mycotic)



Jejunum – hemorrhagic syndrome – ulceration and
intraluminal hematoma – etiology unknown (not mycotic)



Small and large intestine - volvolus



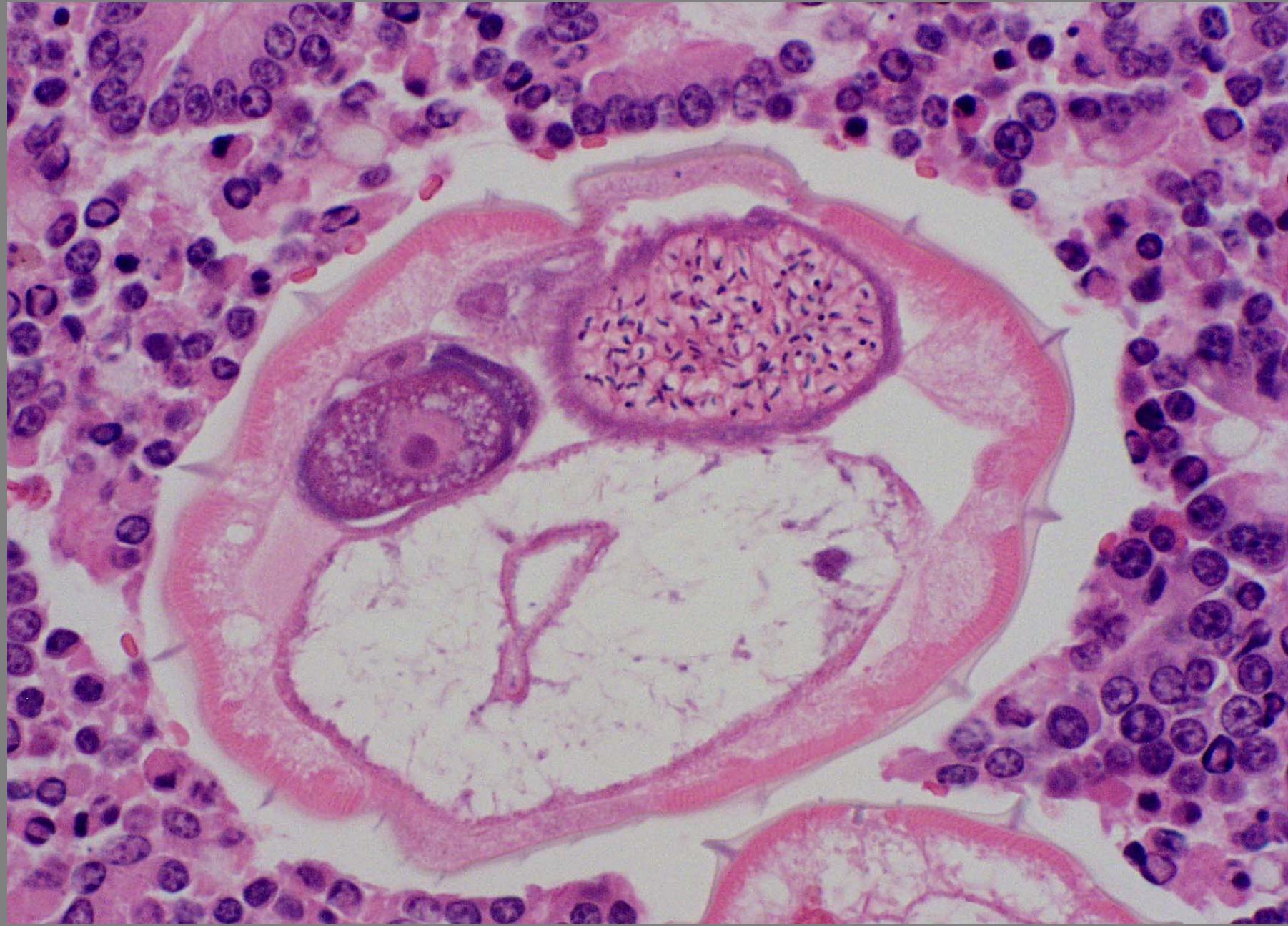
Small intestine – ulcerative granulomatous caseous enteritis
– *Mycobacterium bovis* – Italy 1954 – G. Mandelli.



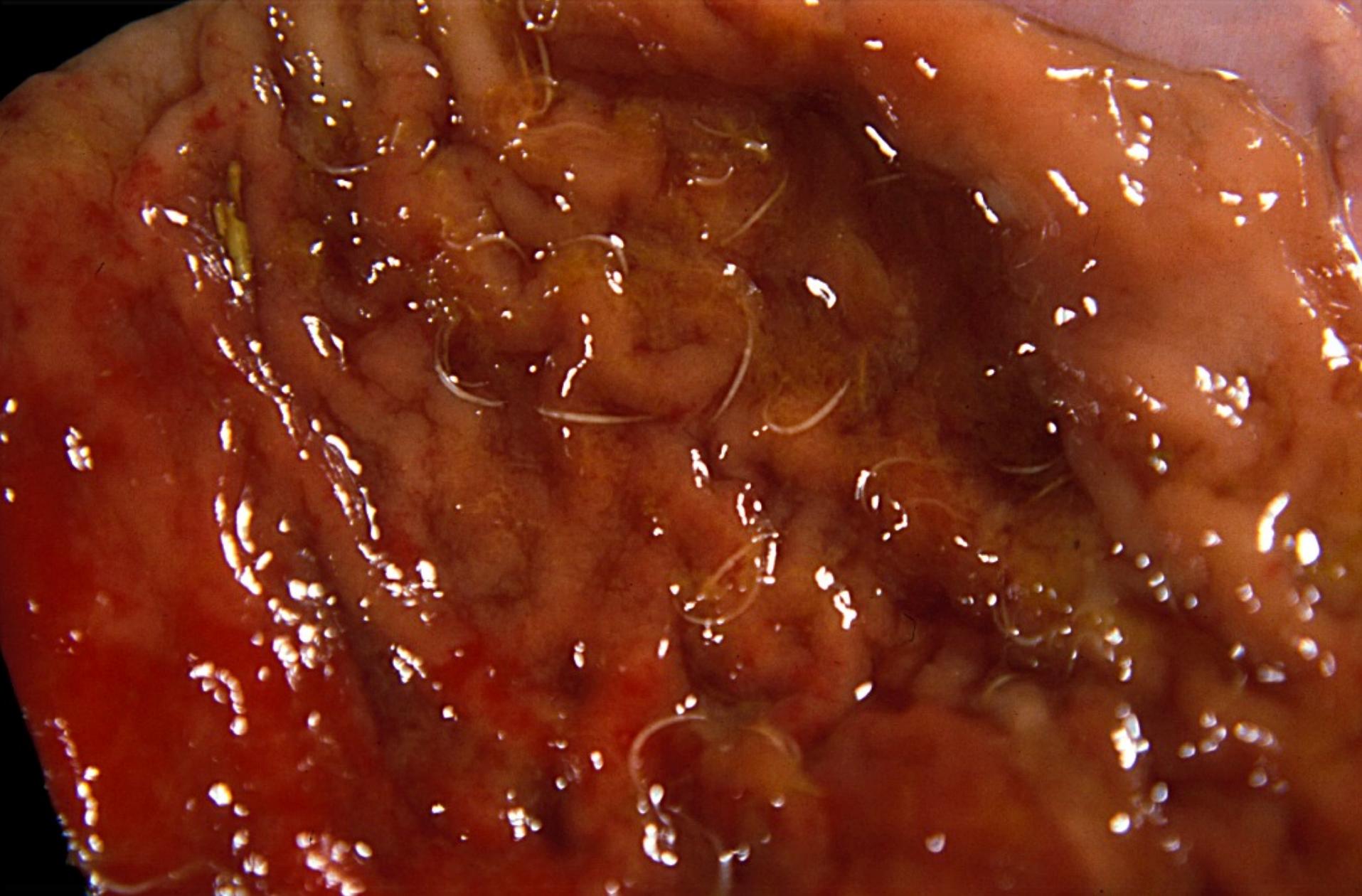
Channel island breed cow - Colon fat necrosis



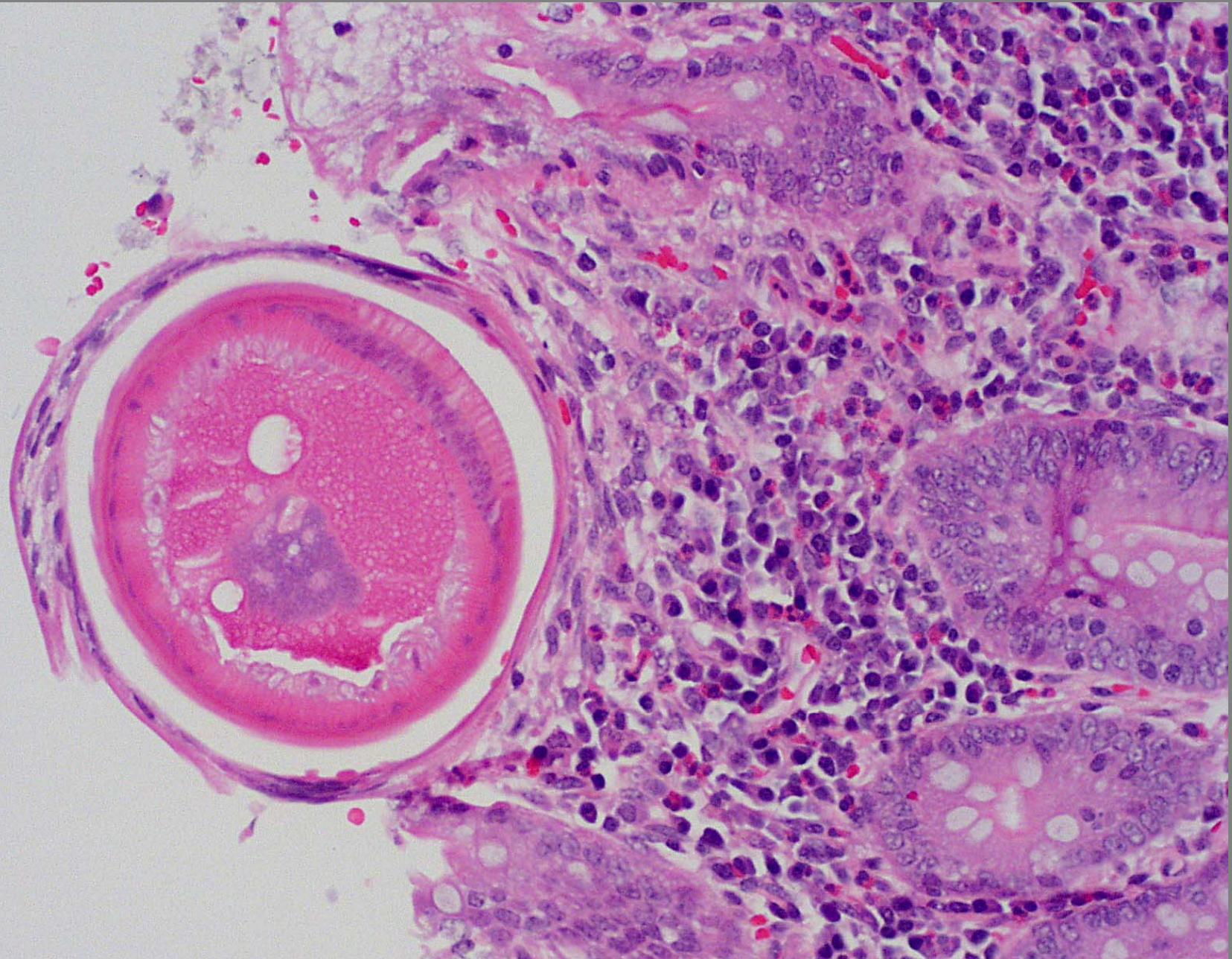
Distal colon – dorsal rupture



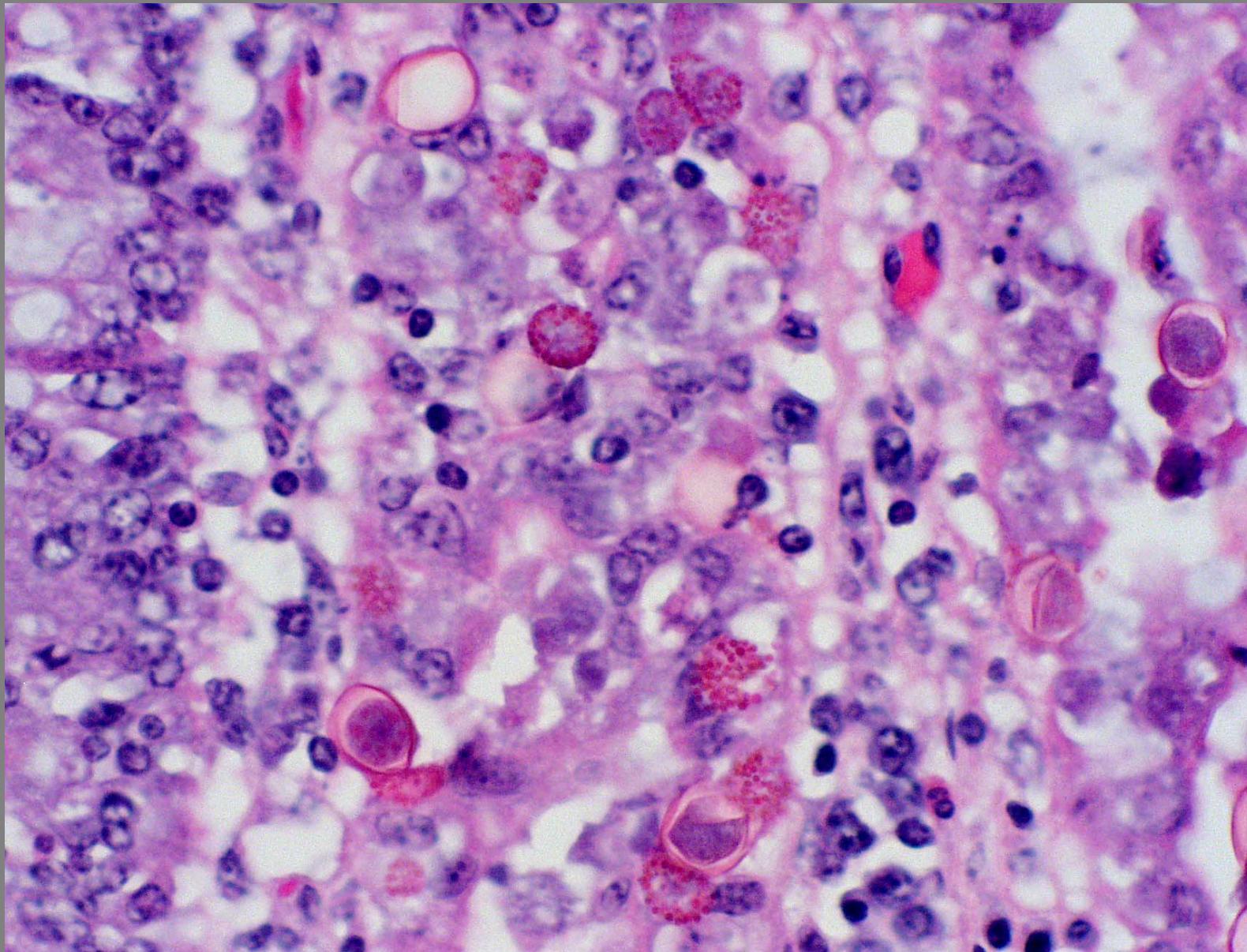
Intestine – Nematodiasis



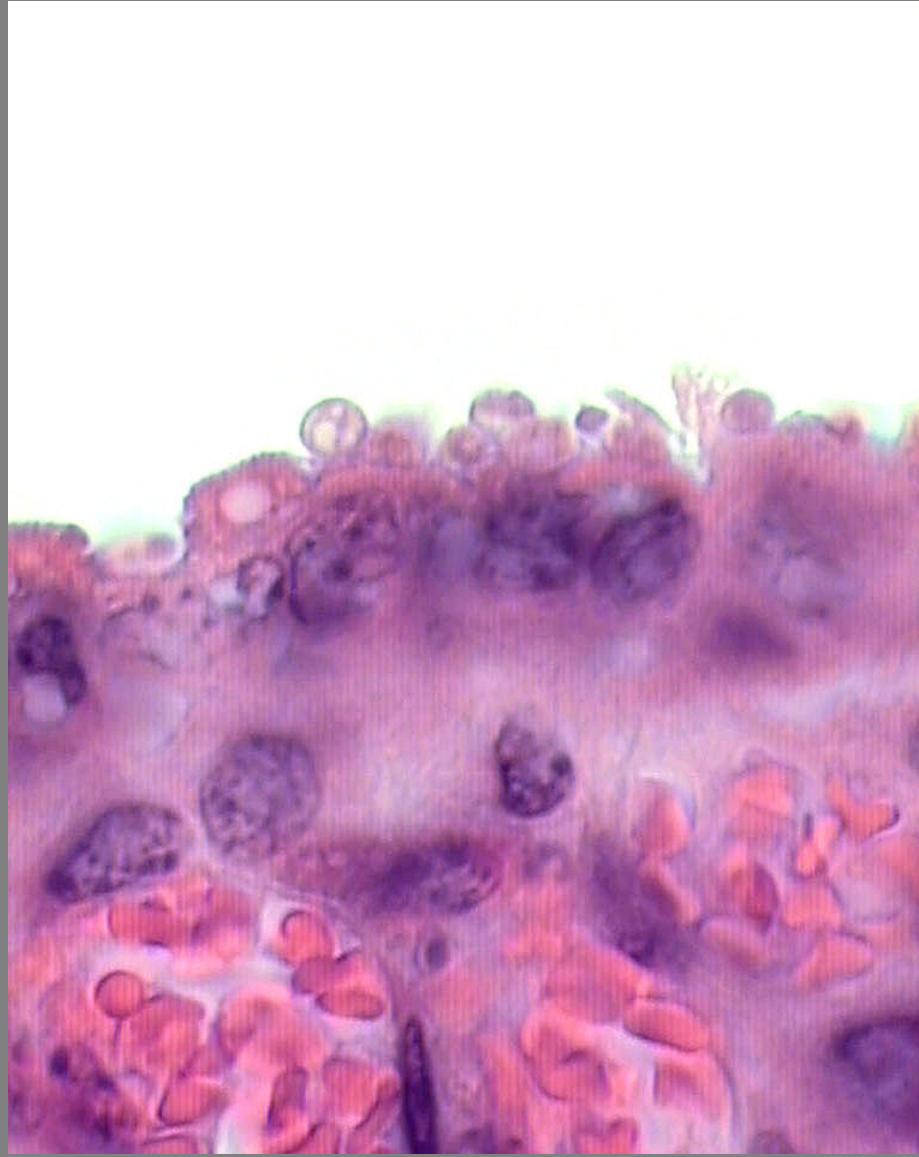
Cecum – catarrhal typhlitis – *Trichuris discolor*



Cecum – chronic typhlitis – *Trichuris disolor*

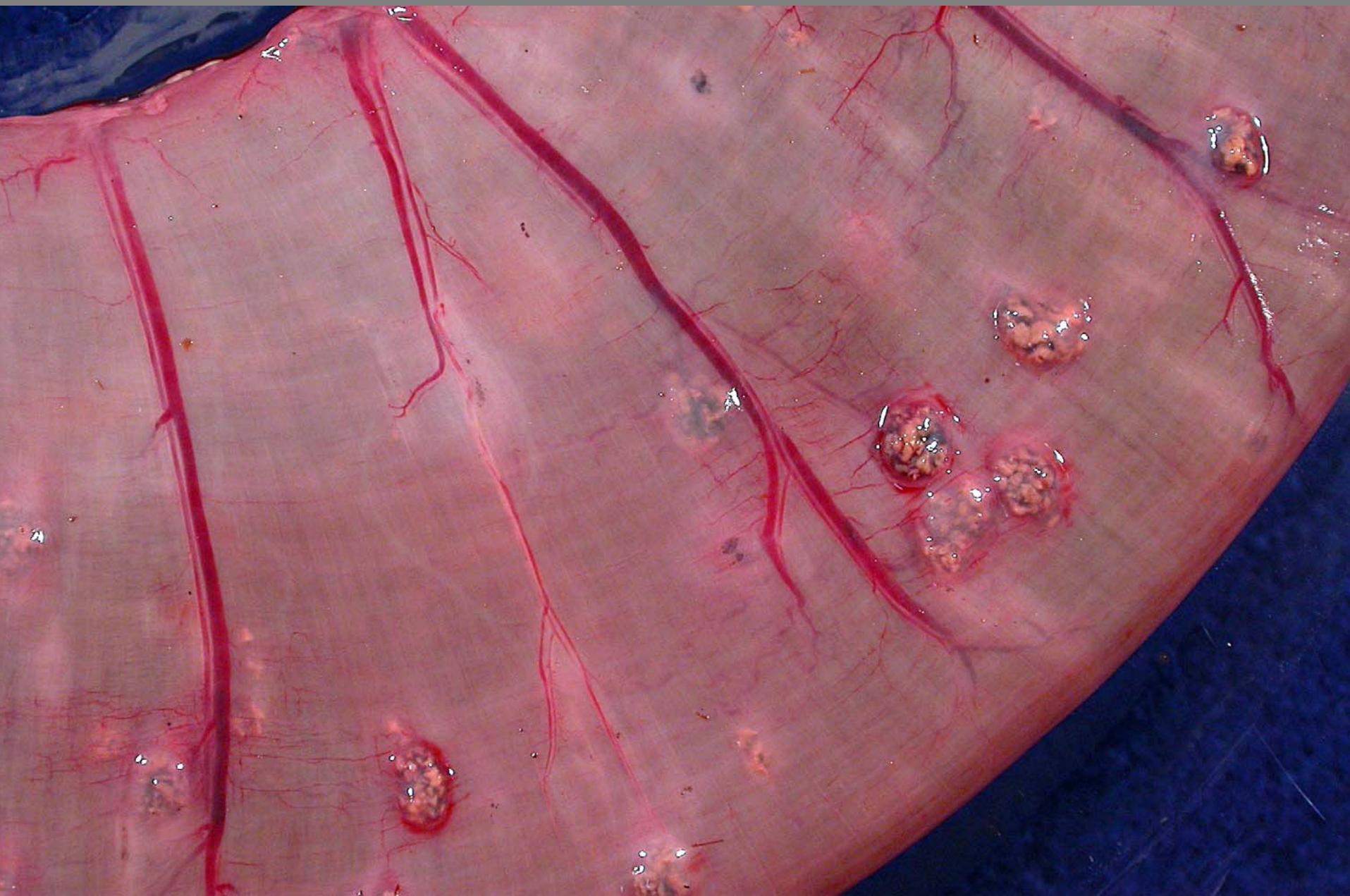


Calf – ileum – chronic enteritis– coccidiosis – *Eimeria bovis* and *Eimeria zurnii* (a few)



Calf – ileum – *Cryptosporidium parvum*

Small intestine – serosa – *Oesophagostomum* spp.
granulomata

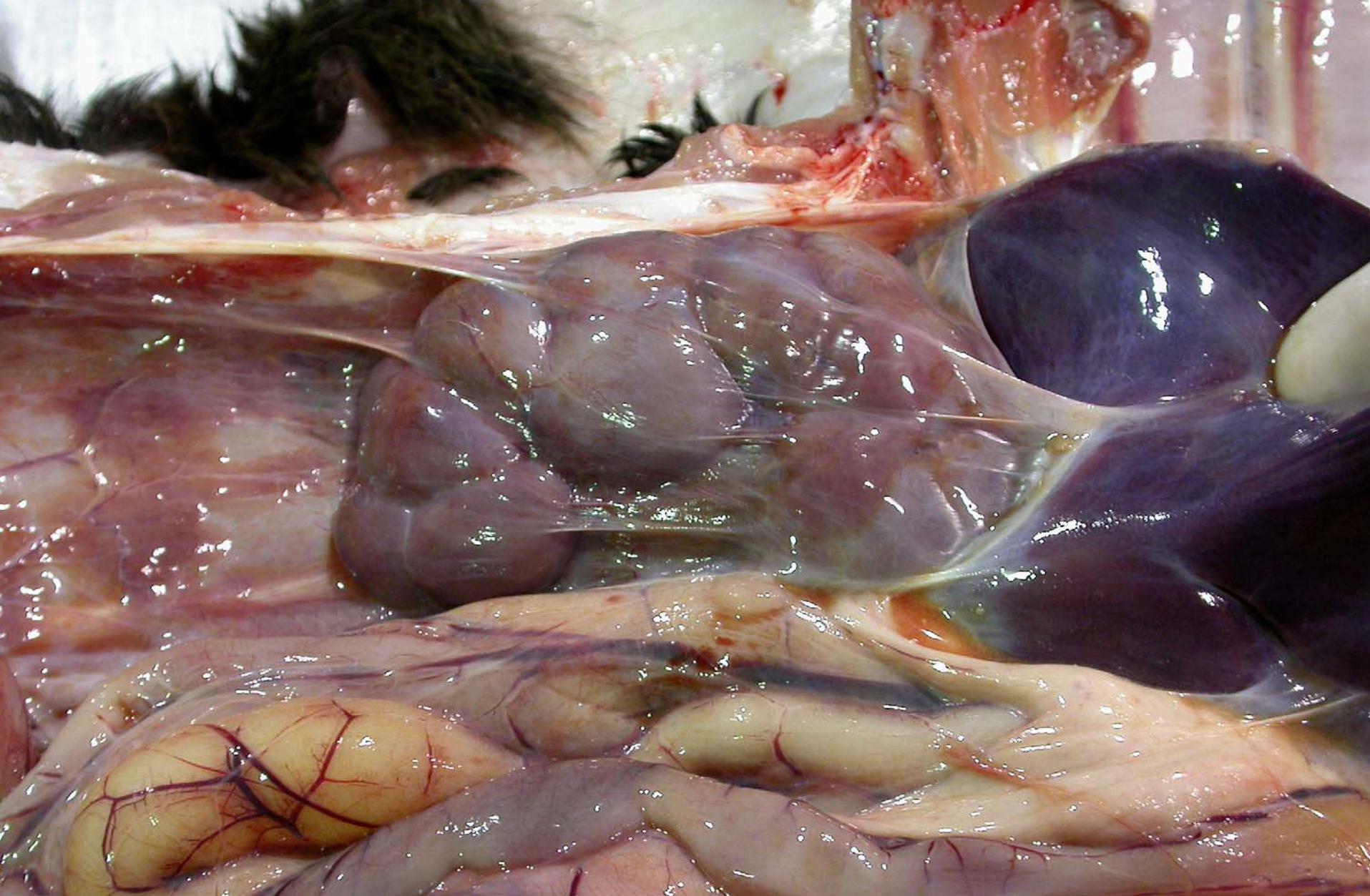




Calf – jejunum – alimentary lymphoma



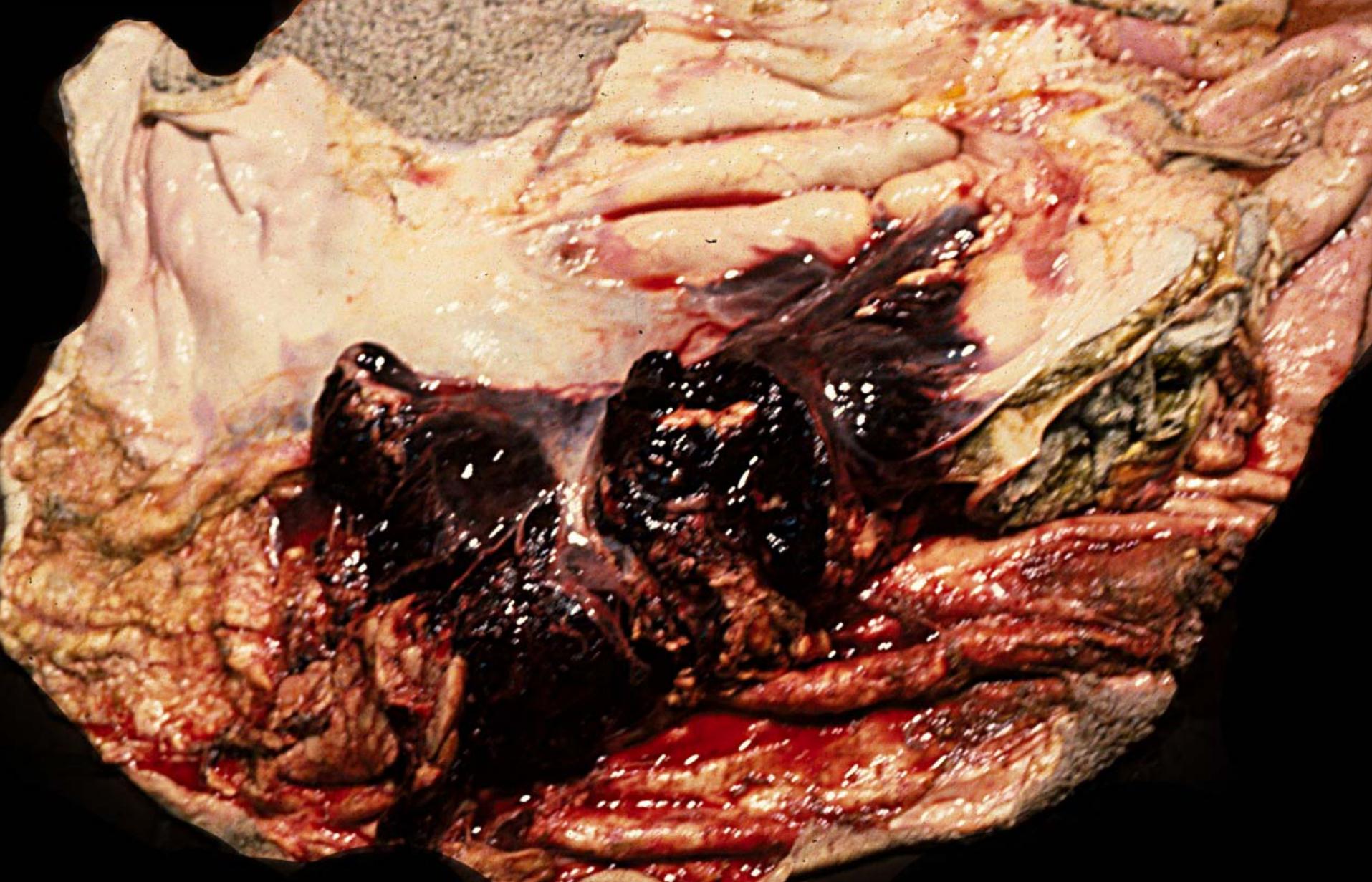
Fibrinous septic peritonitis



Calf – serous atrophy of fat, liver atrophy – winter
hypocaloric emaciation



Cecum- adenocarcinoma



Ruminal arterial wall degeneration with thinning, elastic fibers loss, fibrosis and rupture