SHORT COURSE:
Pathology of Infectious Diseases
Case 4: MYCETOMA

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XXXII Congress of the I.A.P. – Dead Sea, Jordan;16th October, 2018

Relevant disclosures: None

Clinical Details

- Black African female, aged 53 years
- Long-standing mass involving left foot
- Recalls inoculation by thorn some 17 years previously

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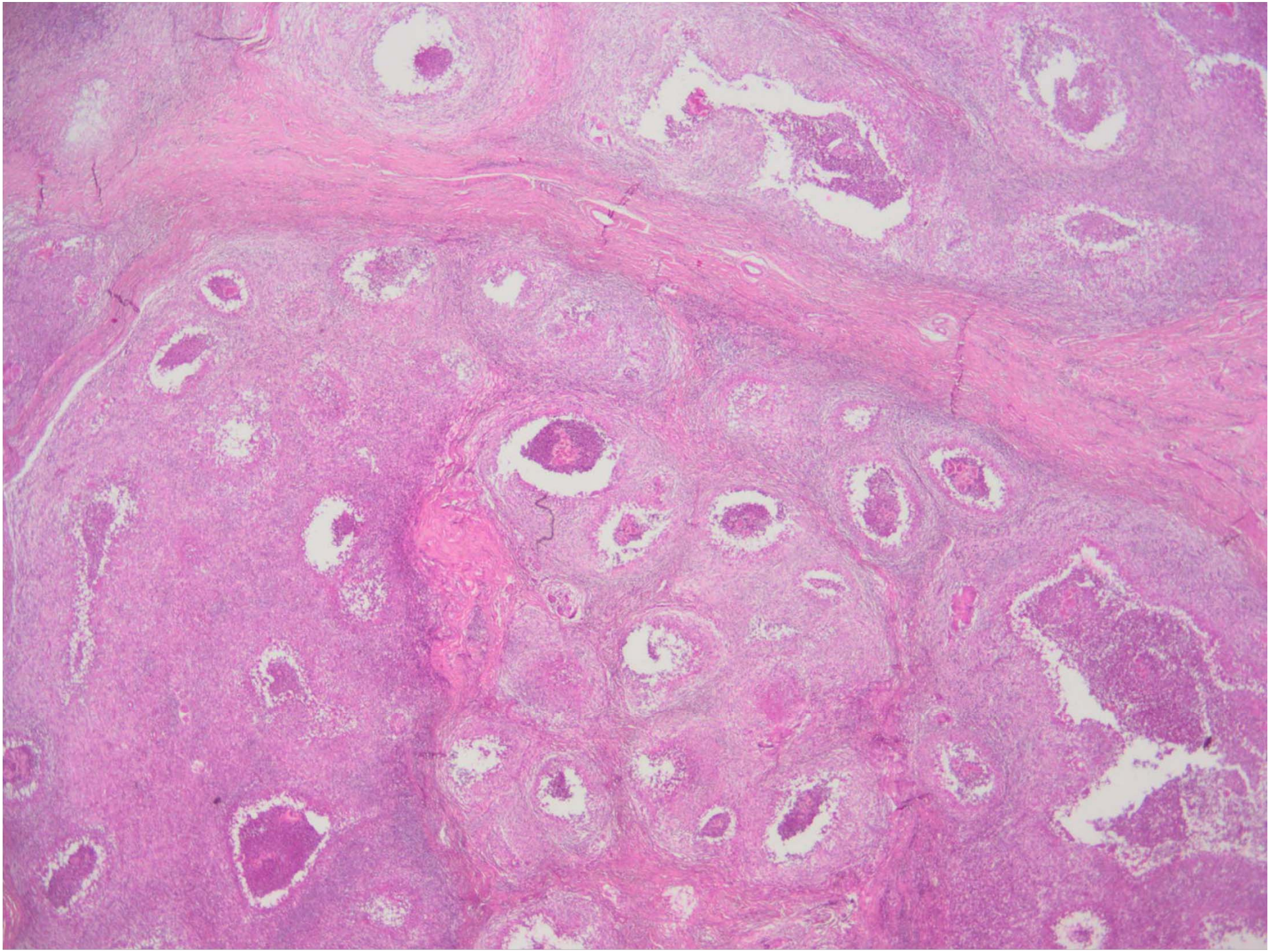

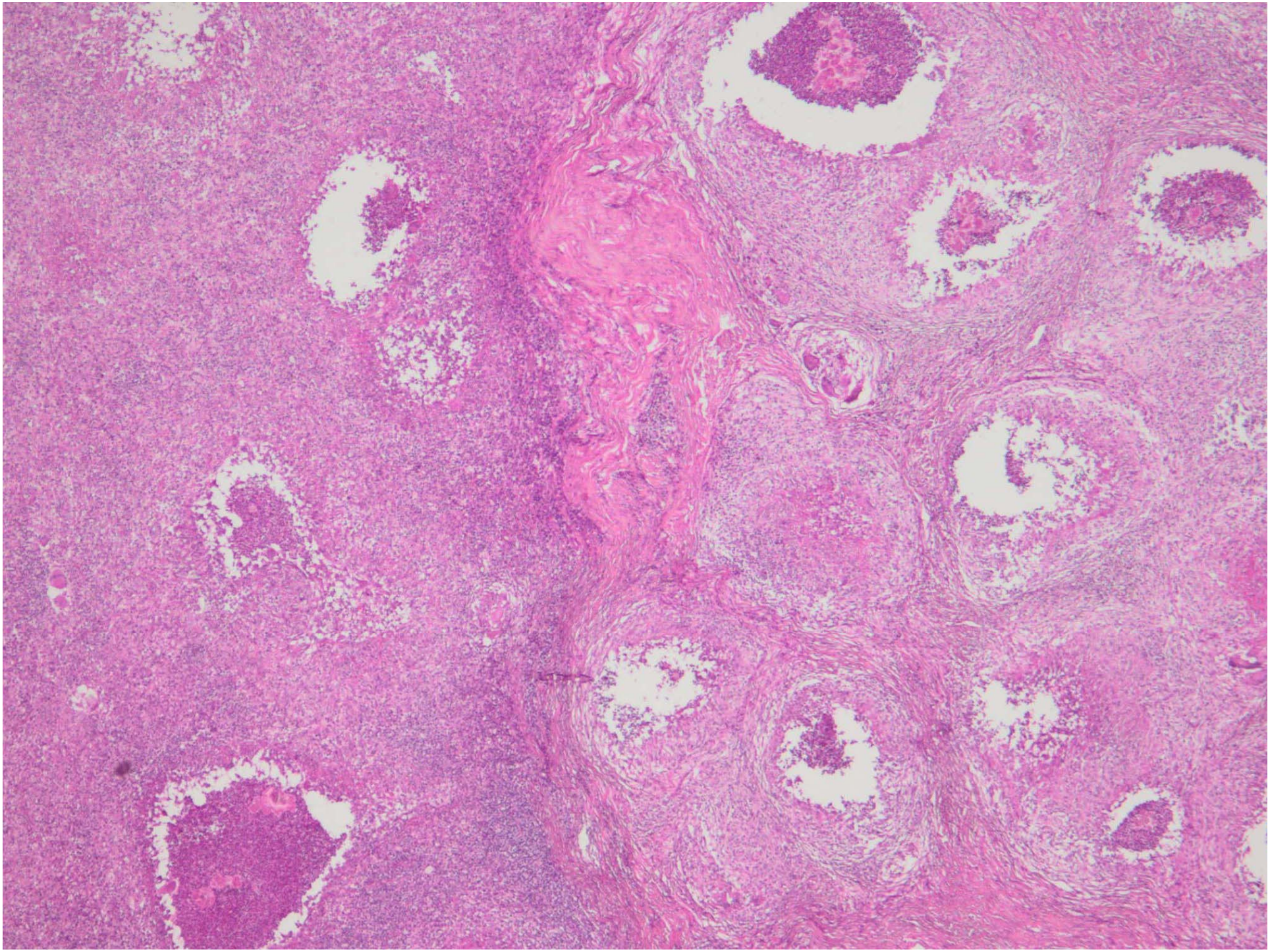

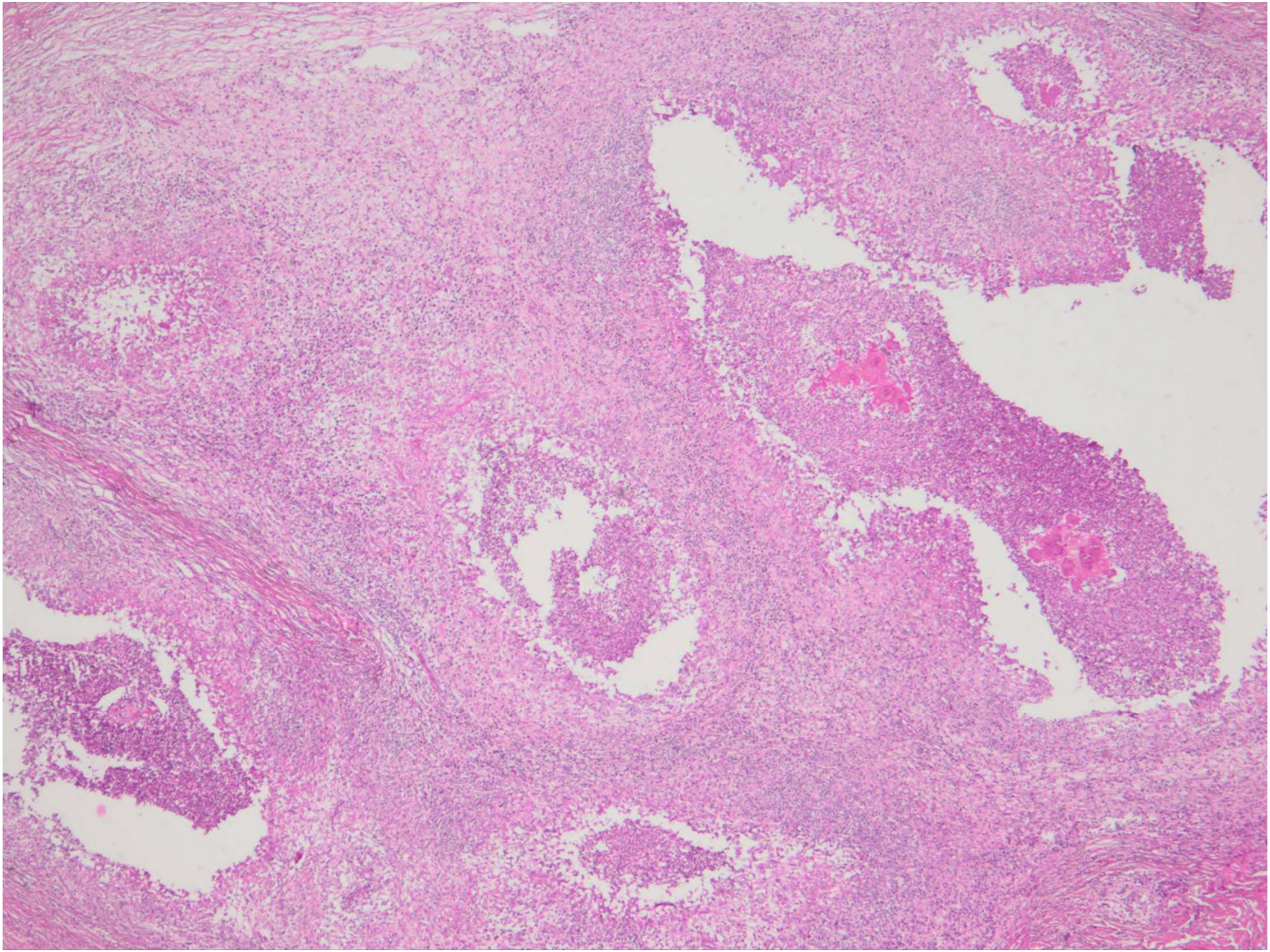

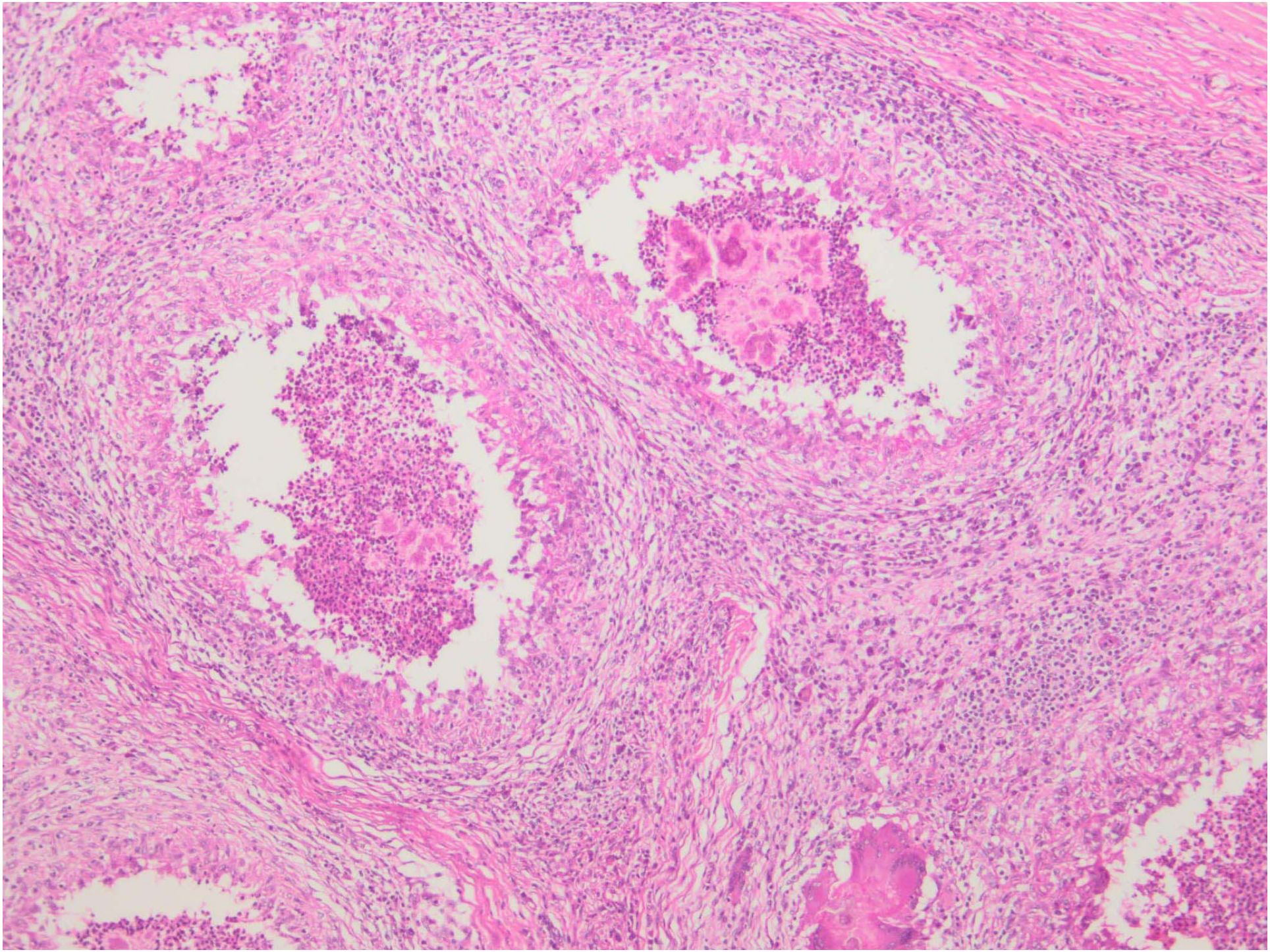

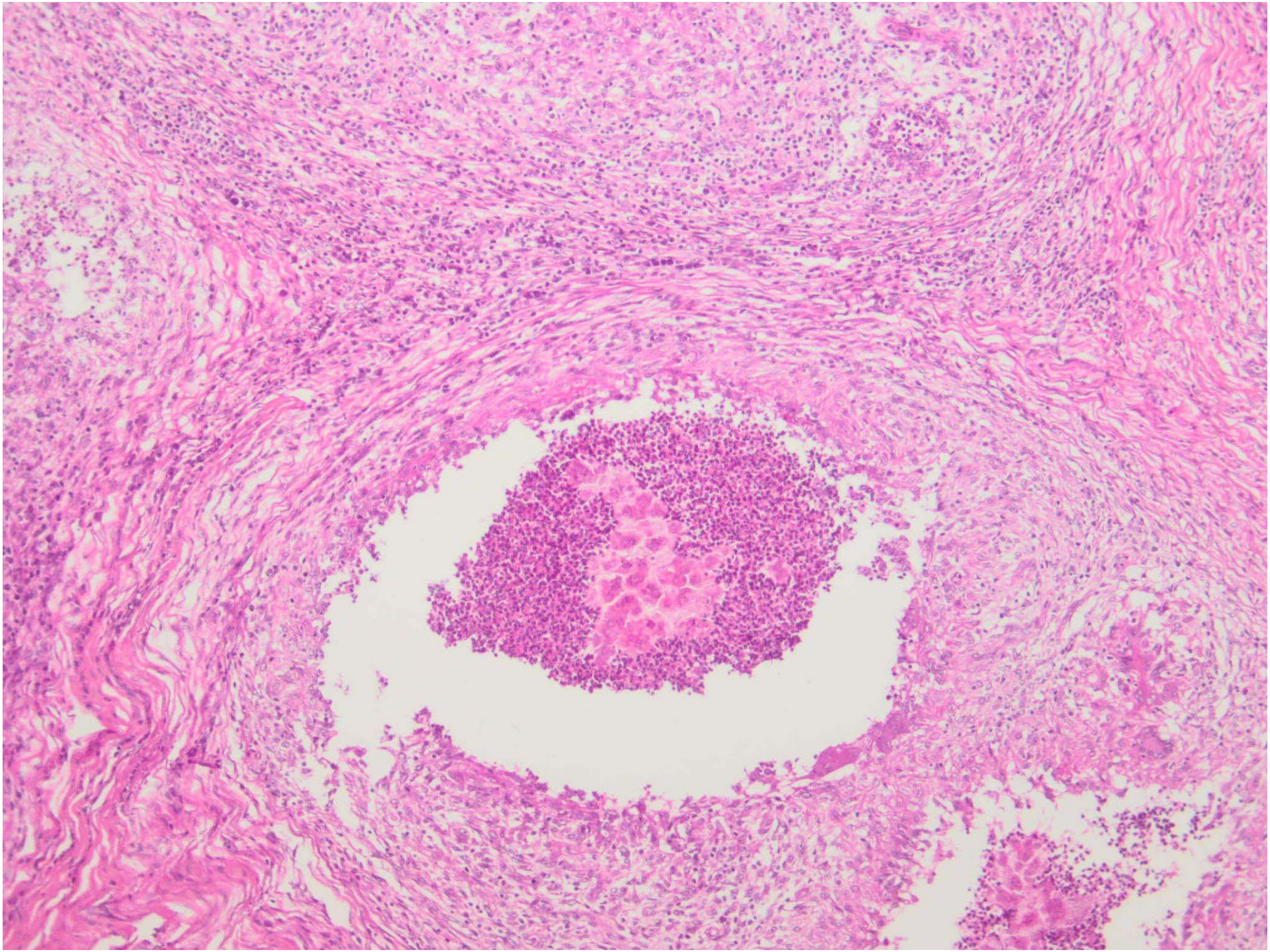

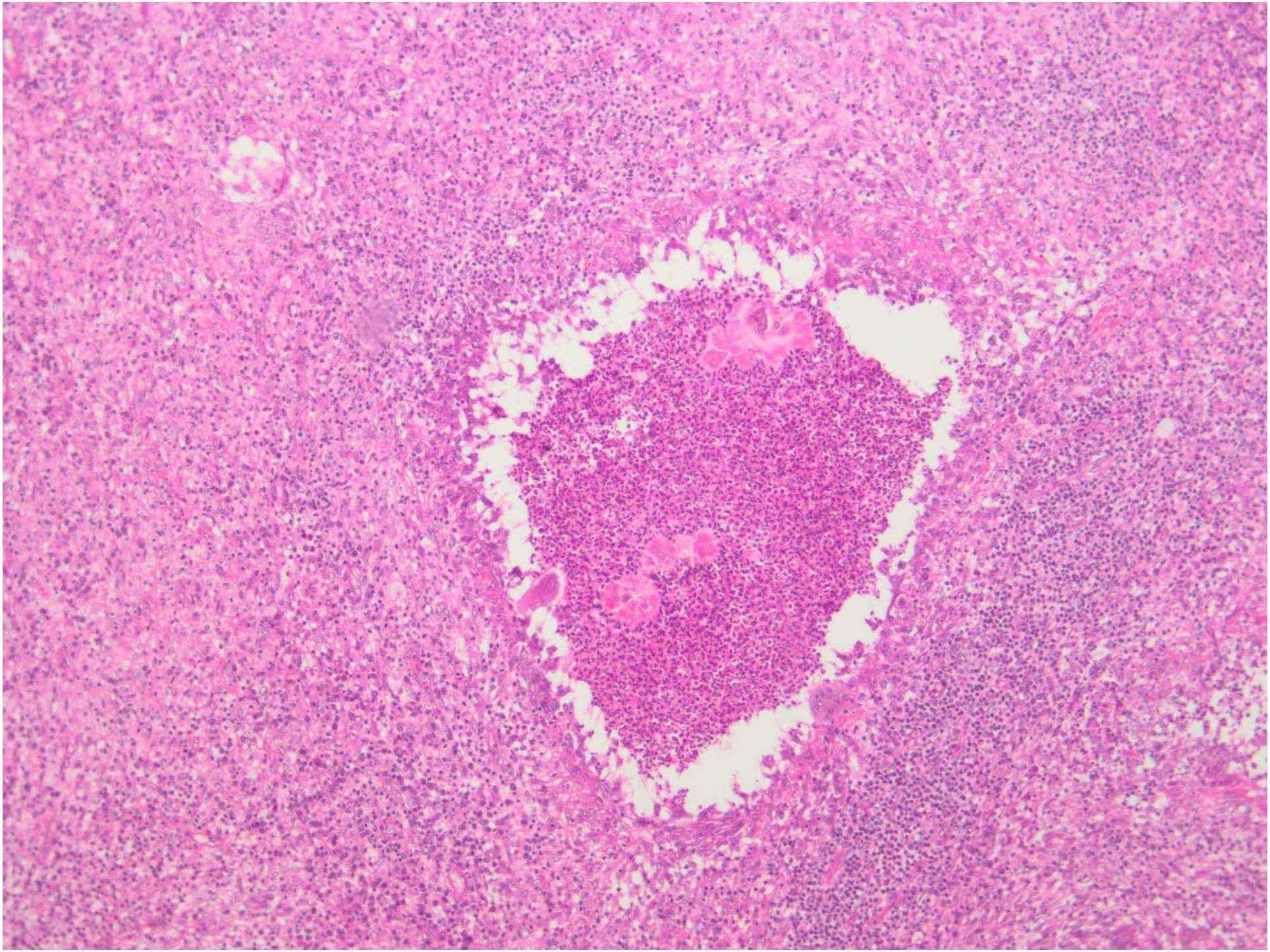

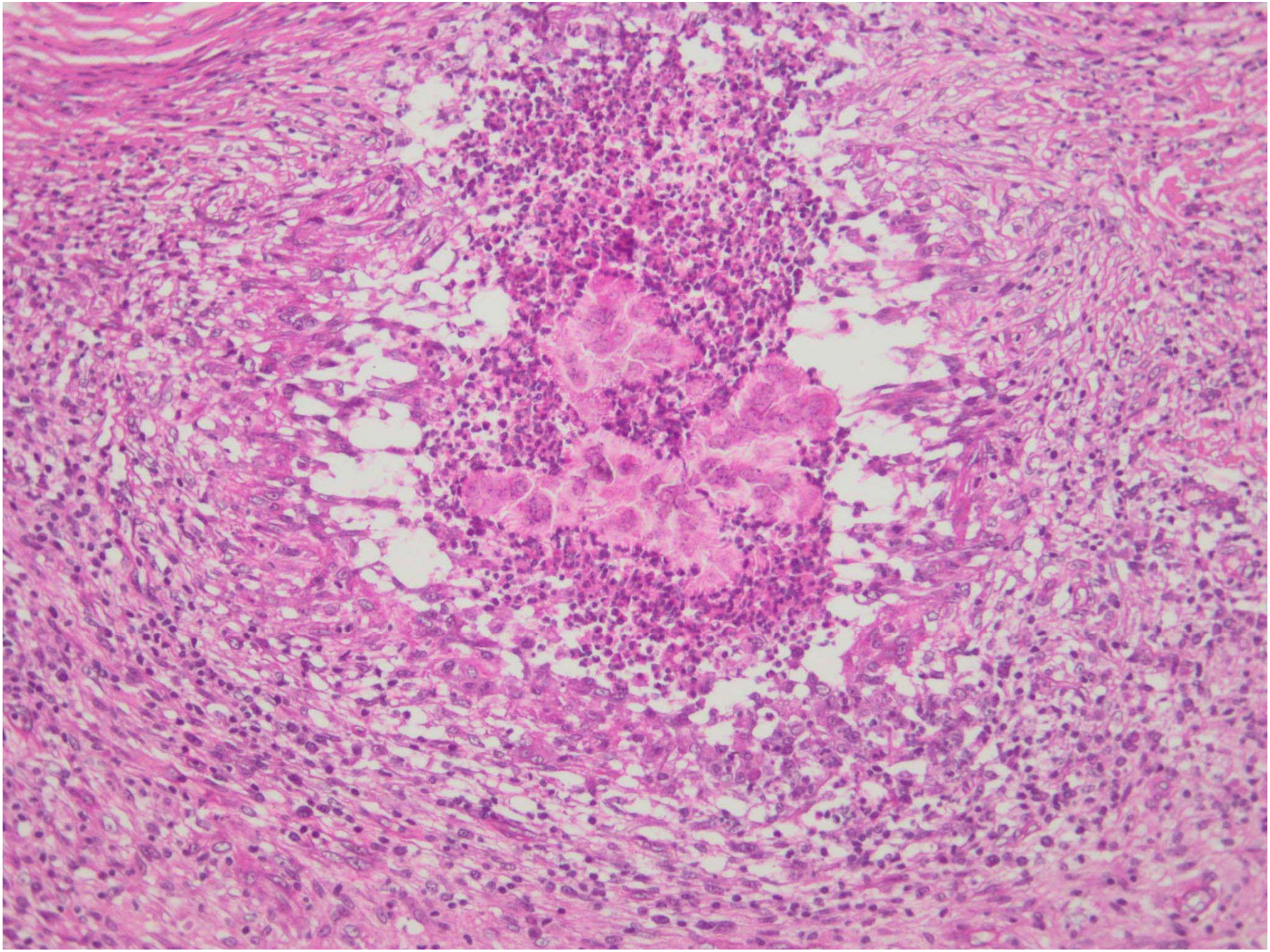

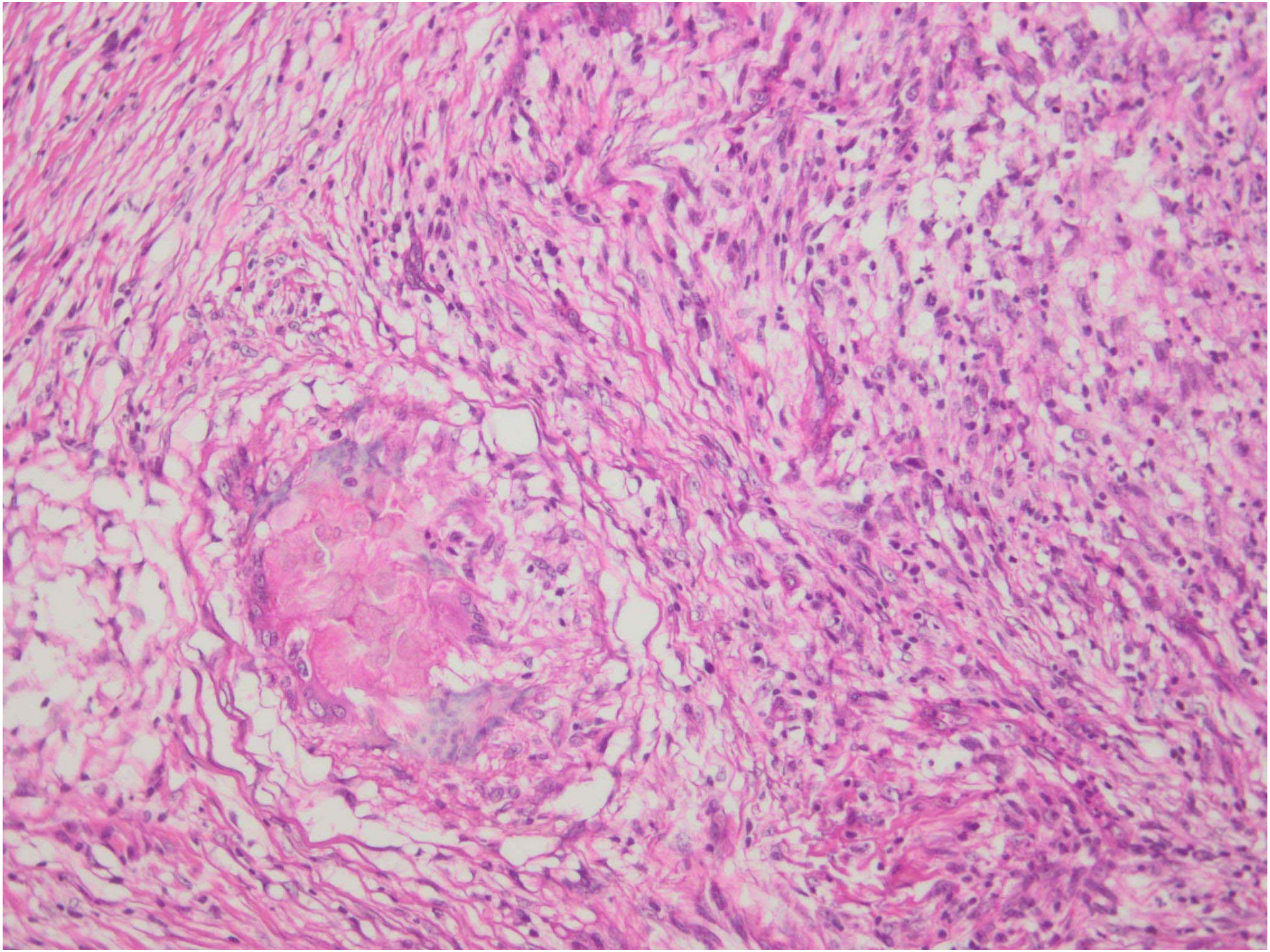

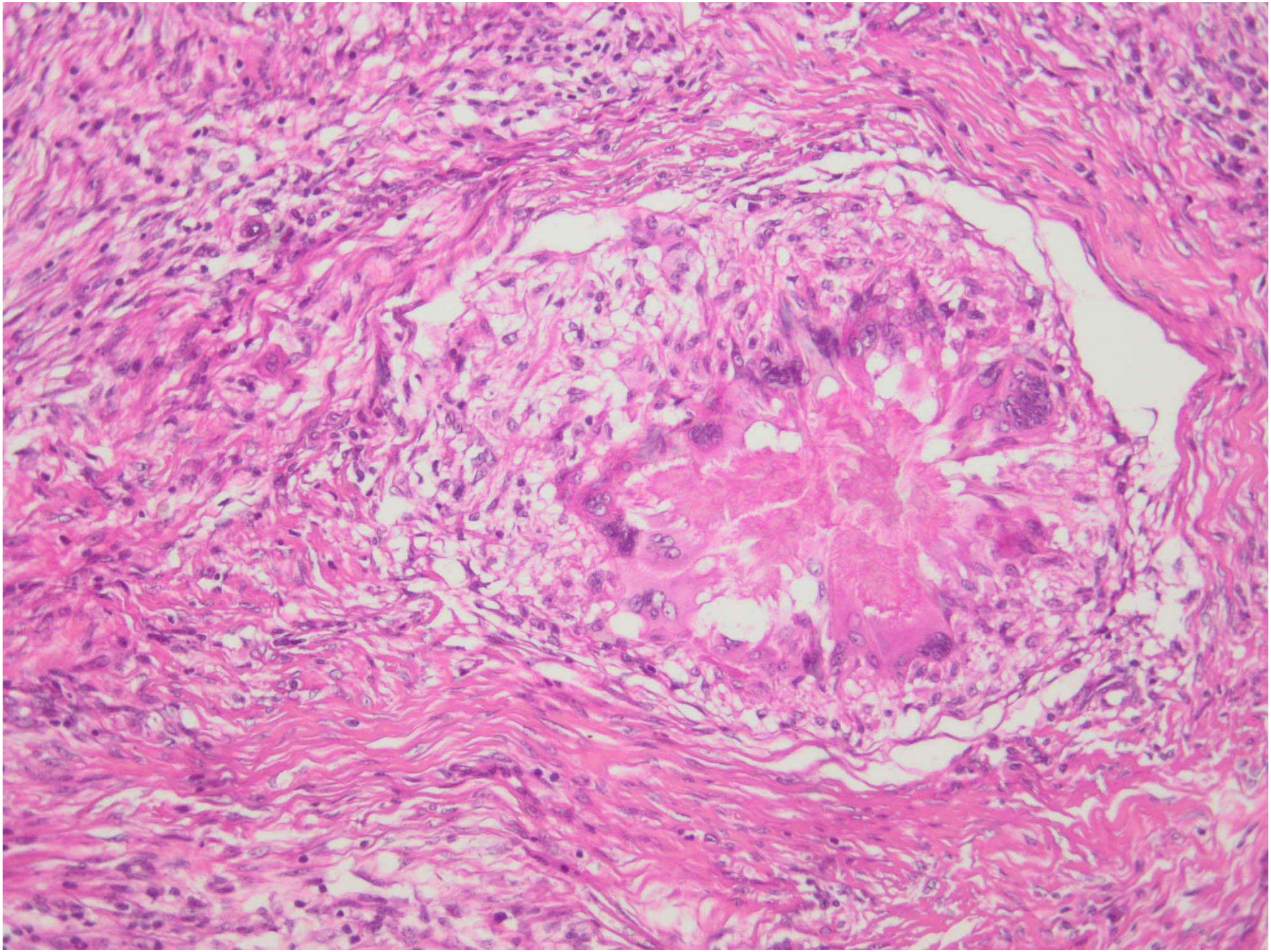

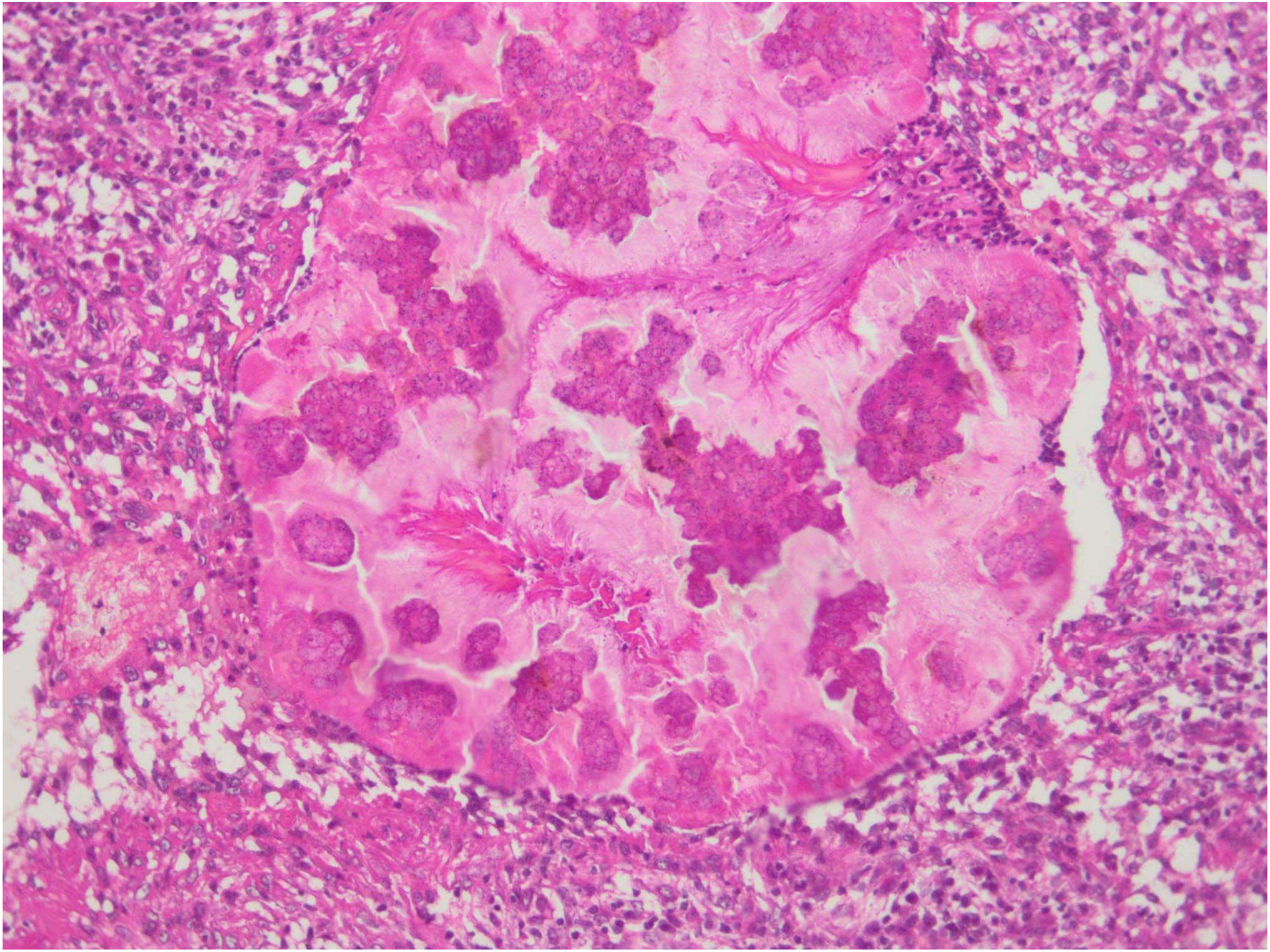

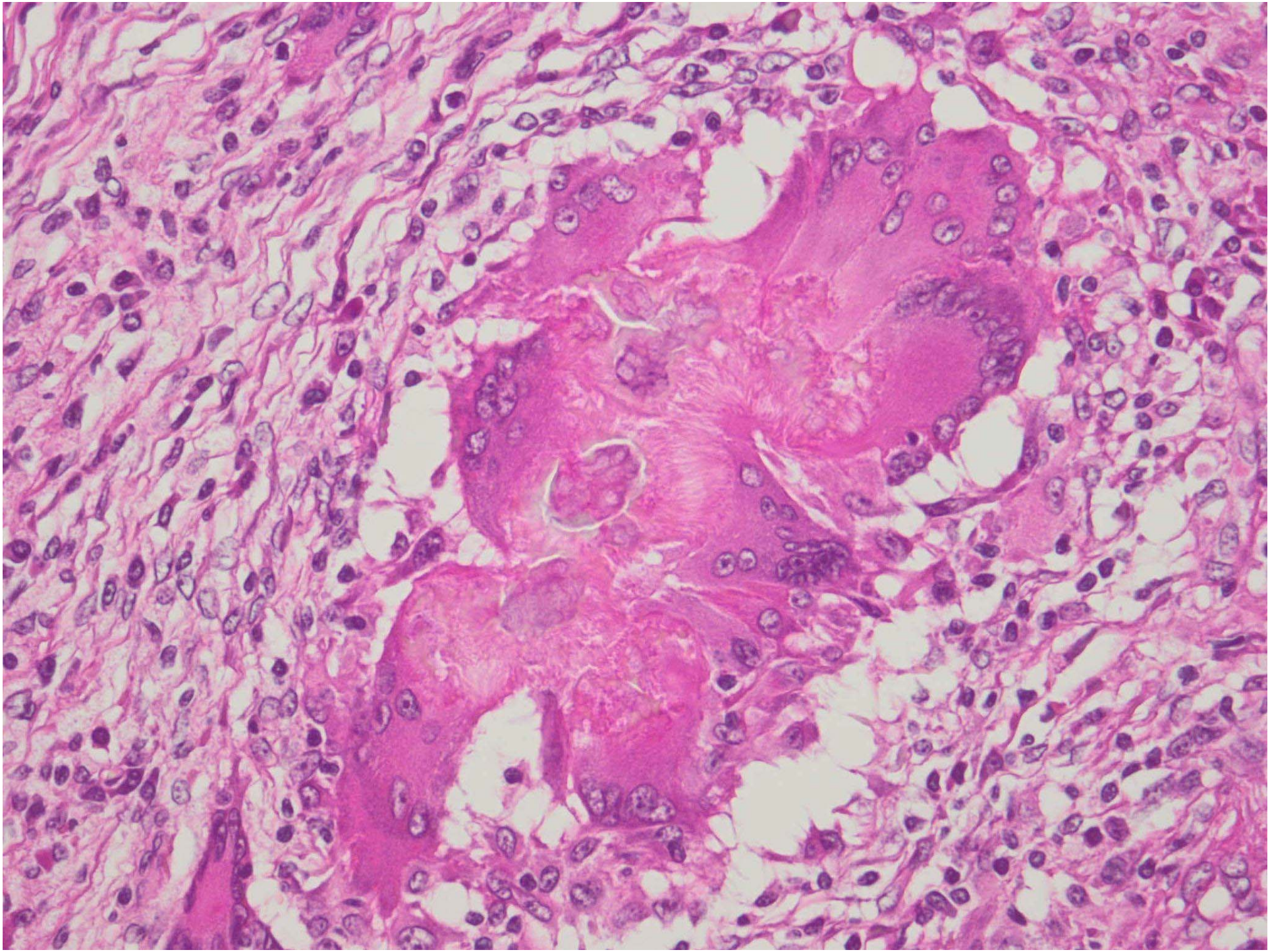

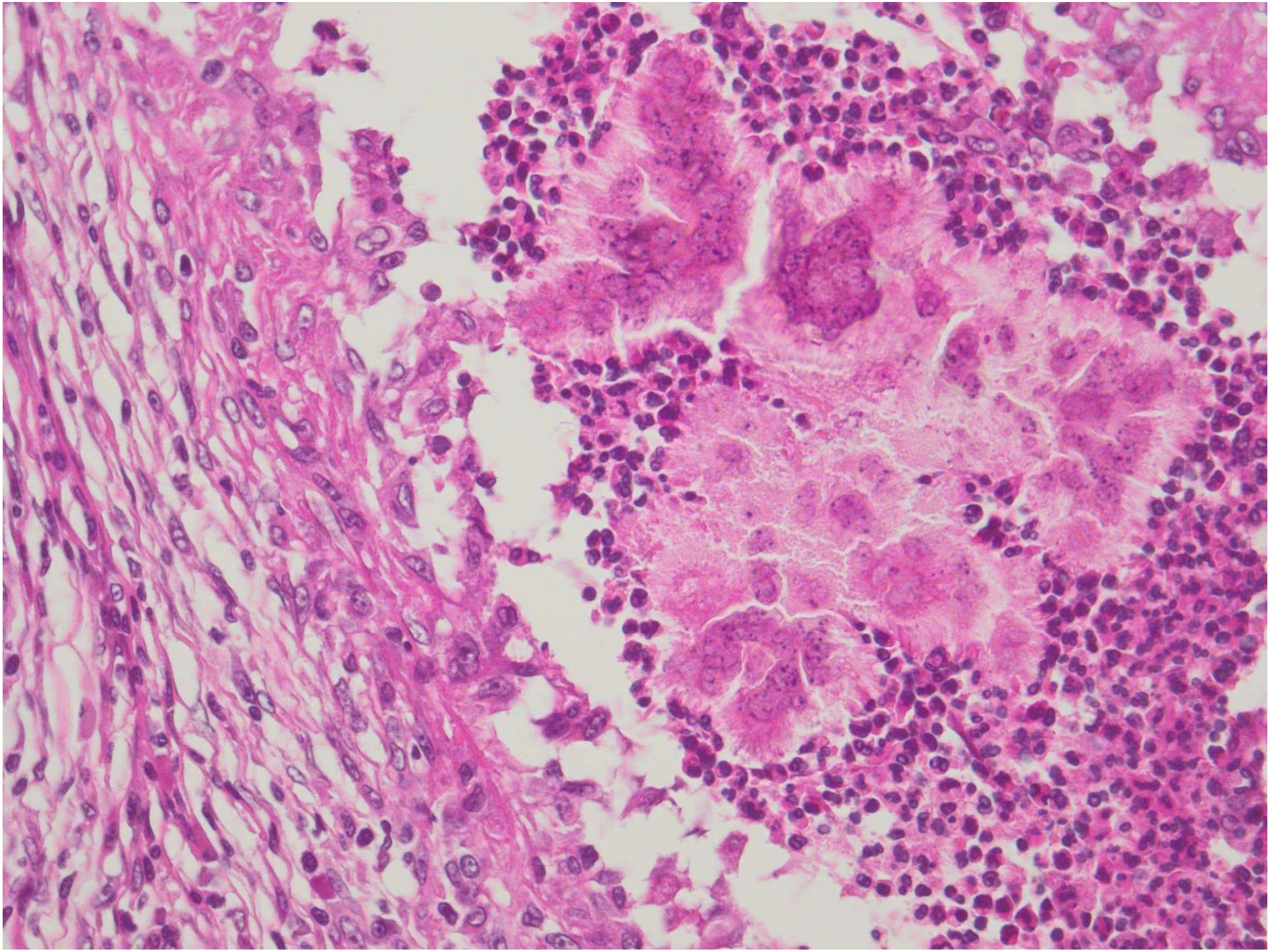

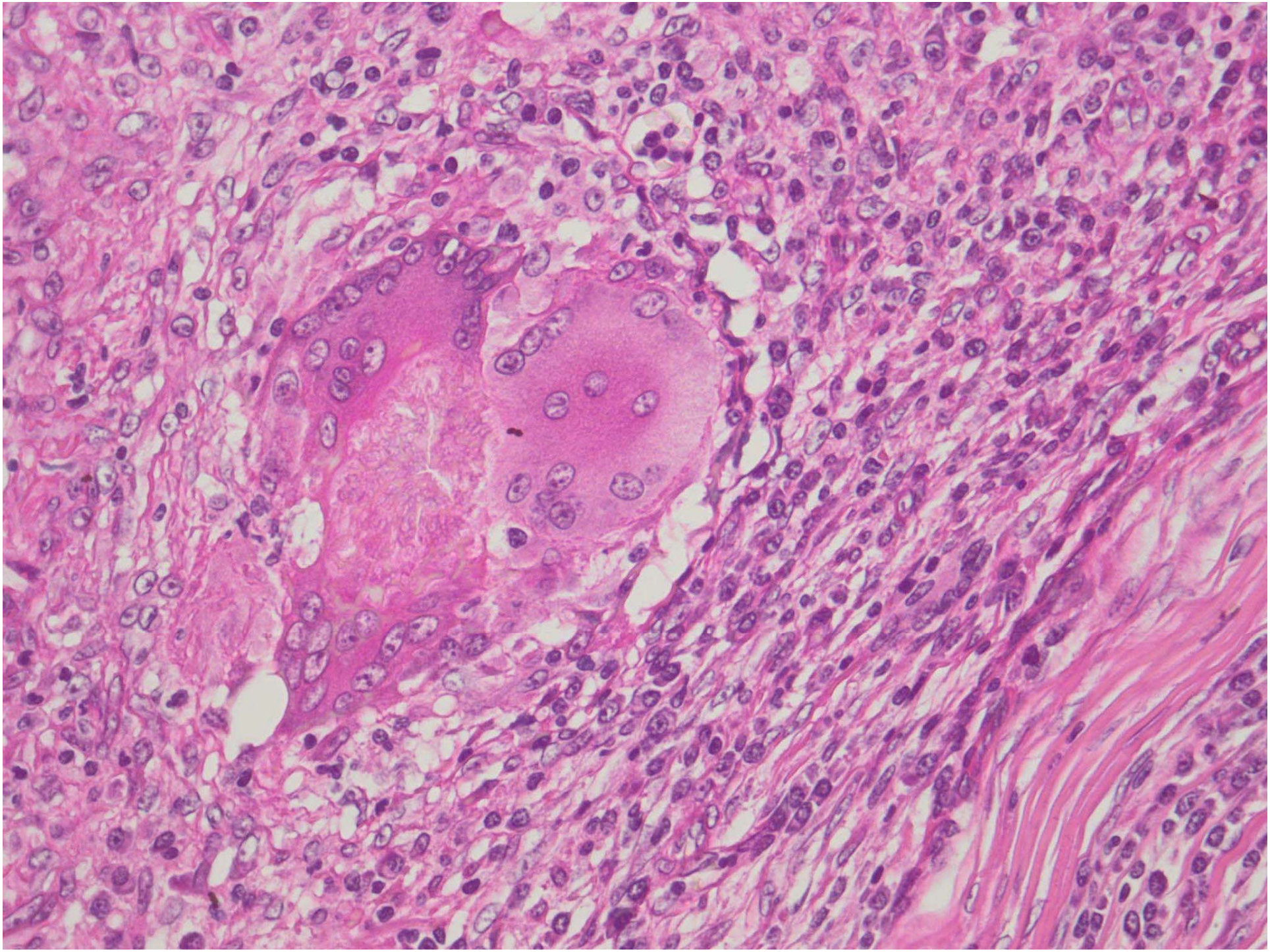

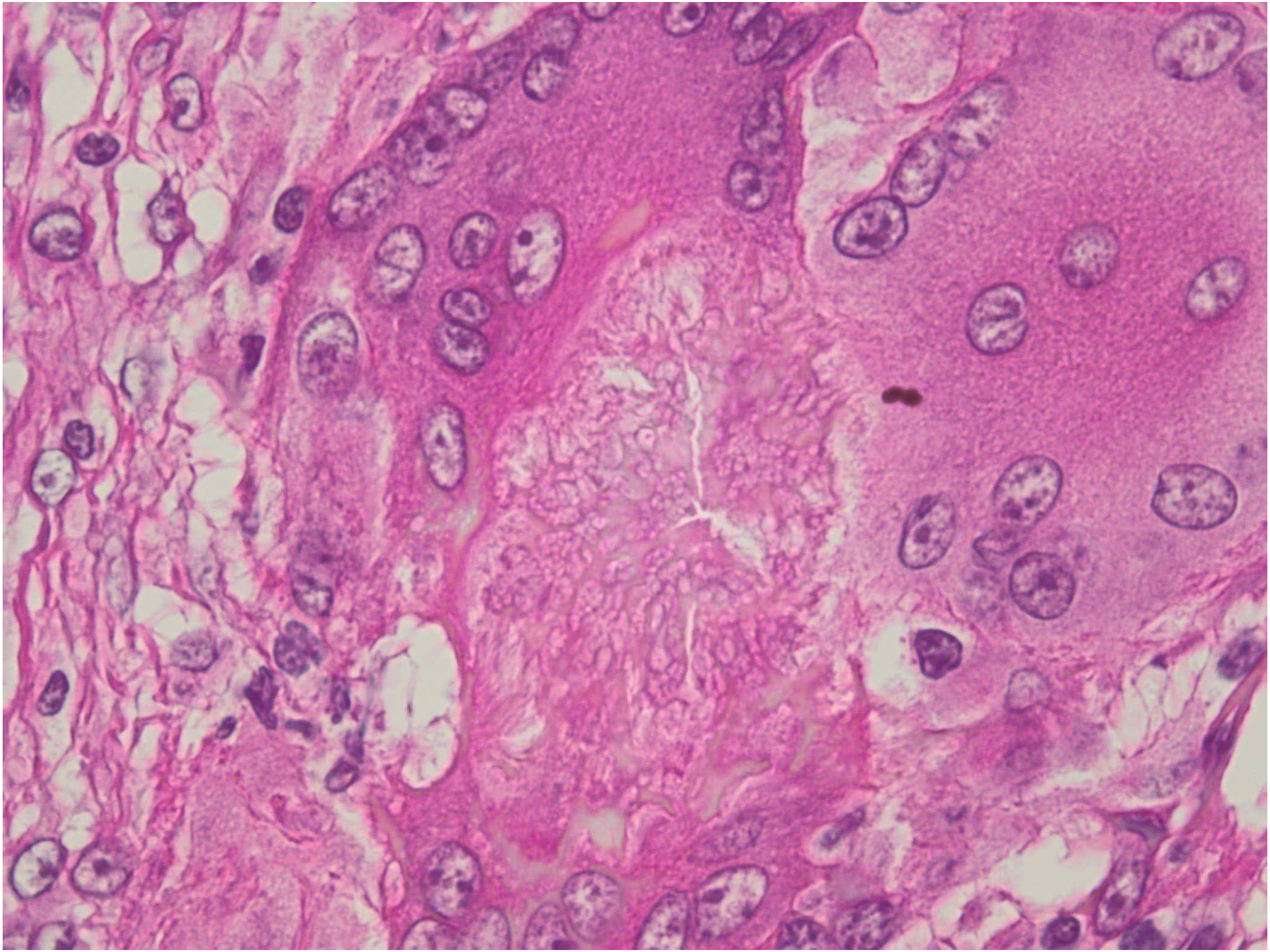

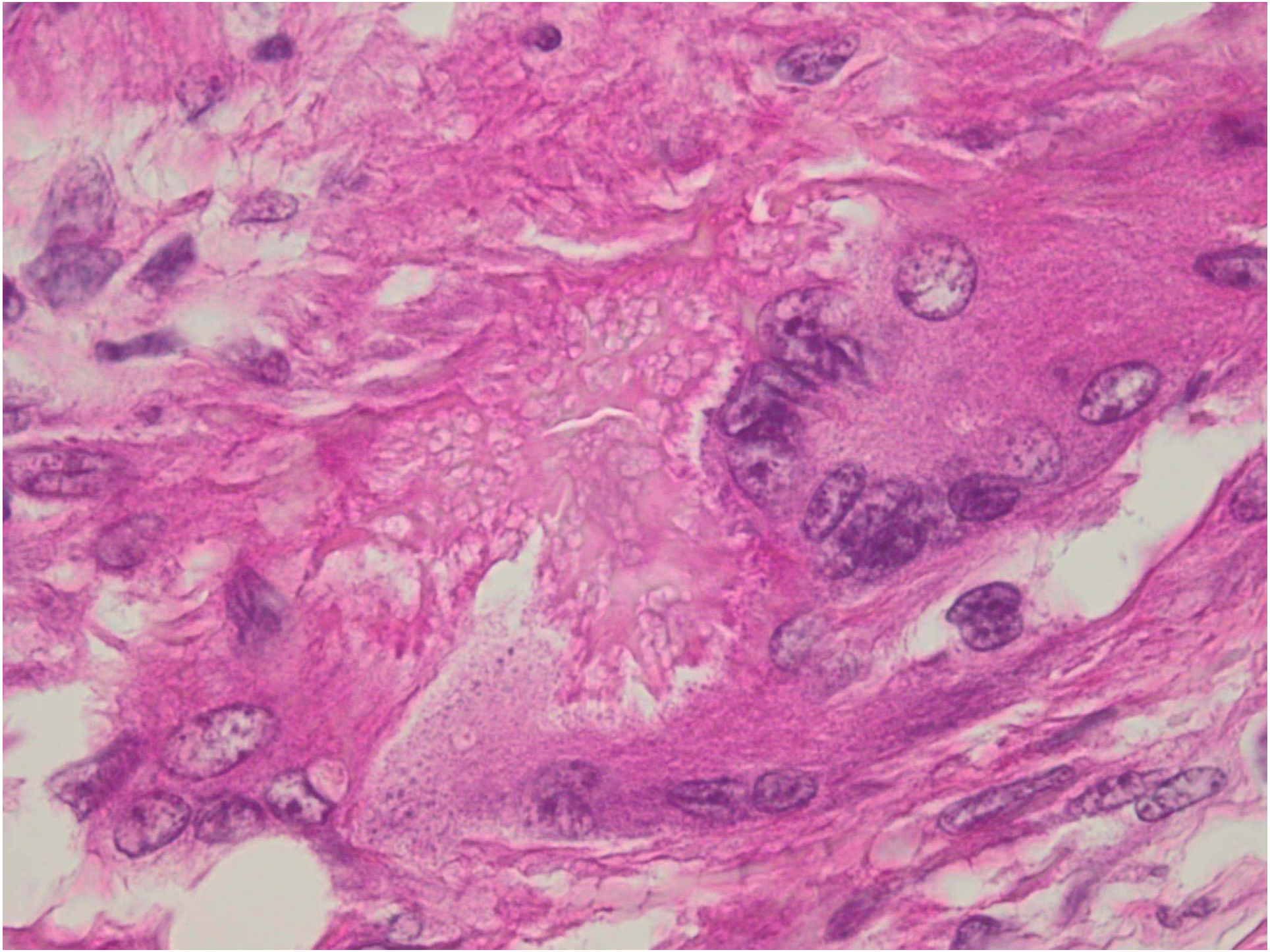

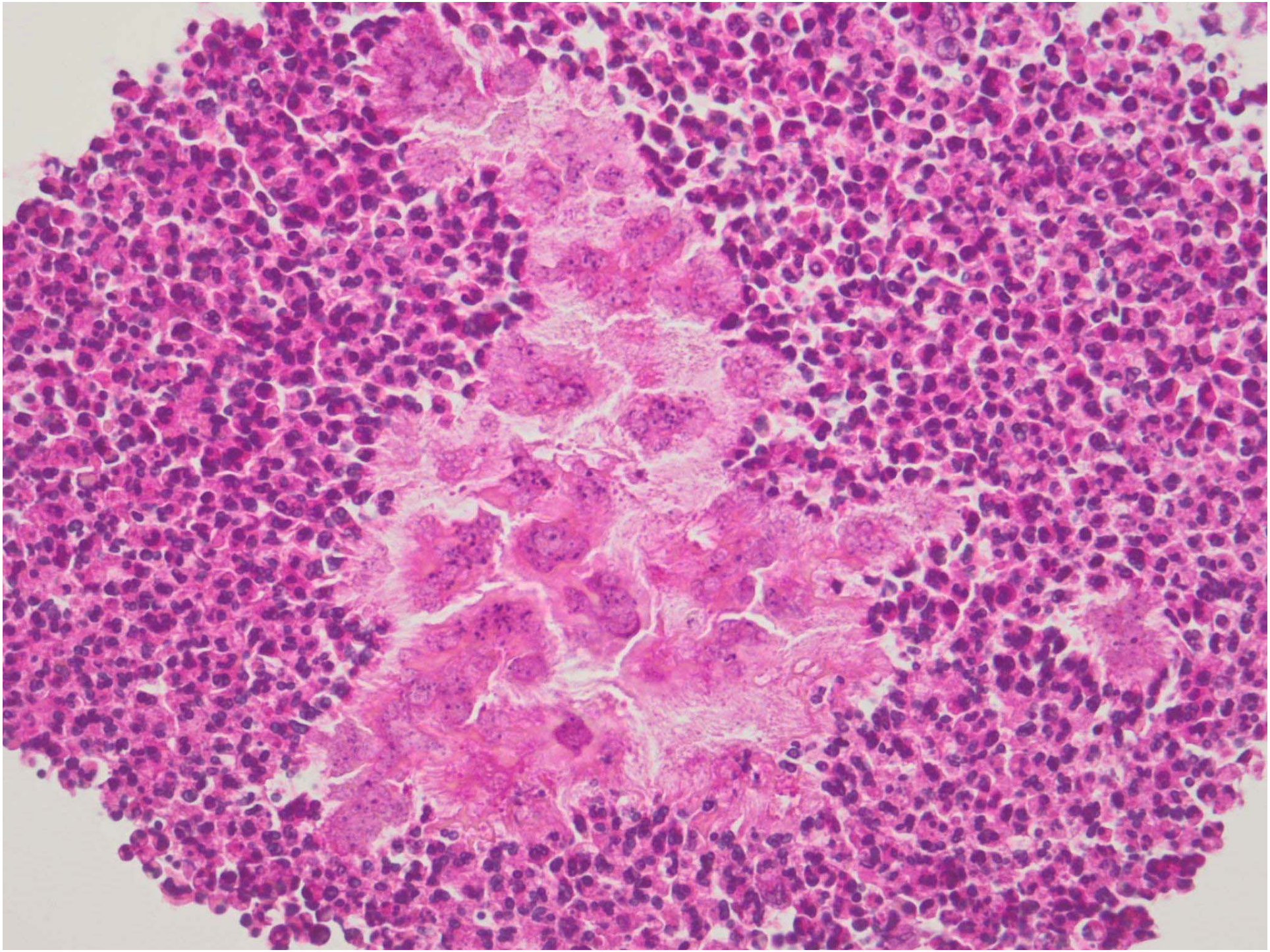

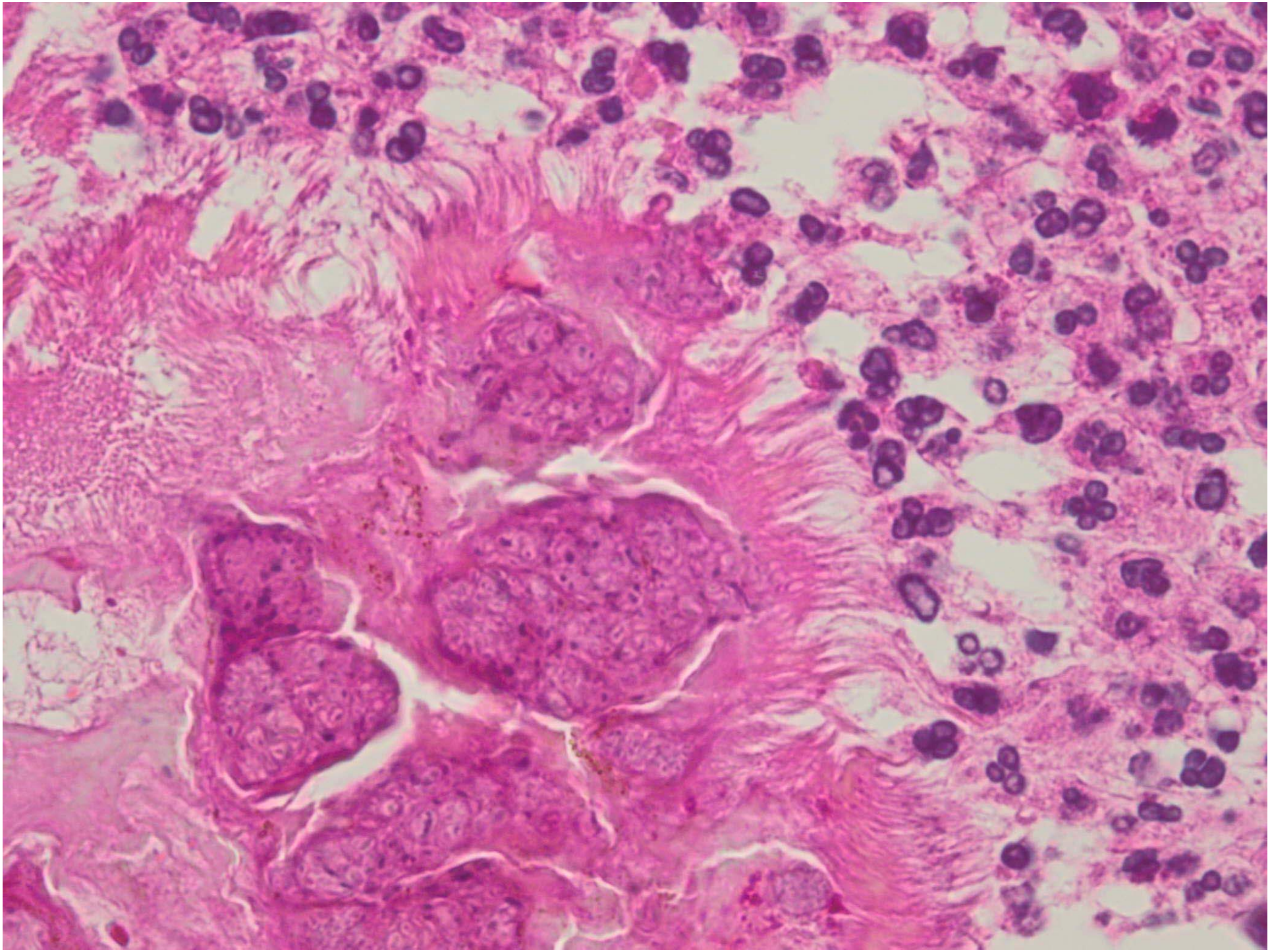

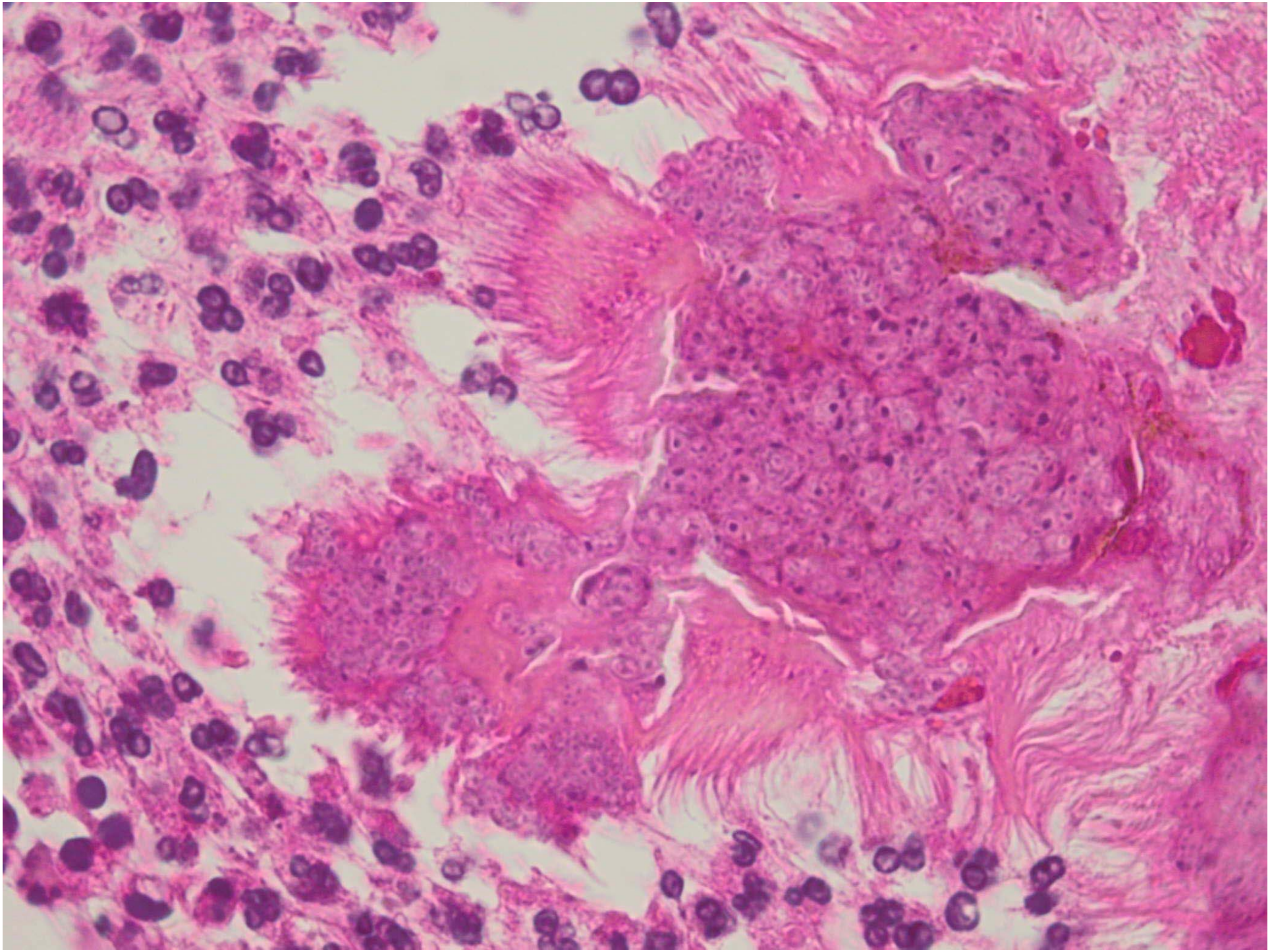

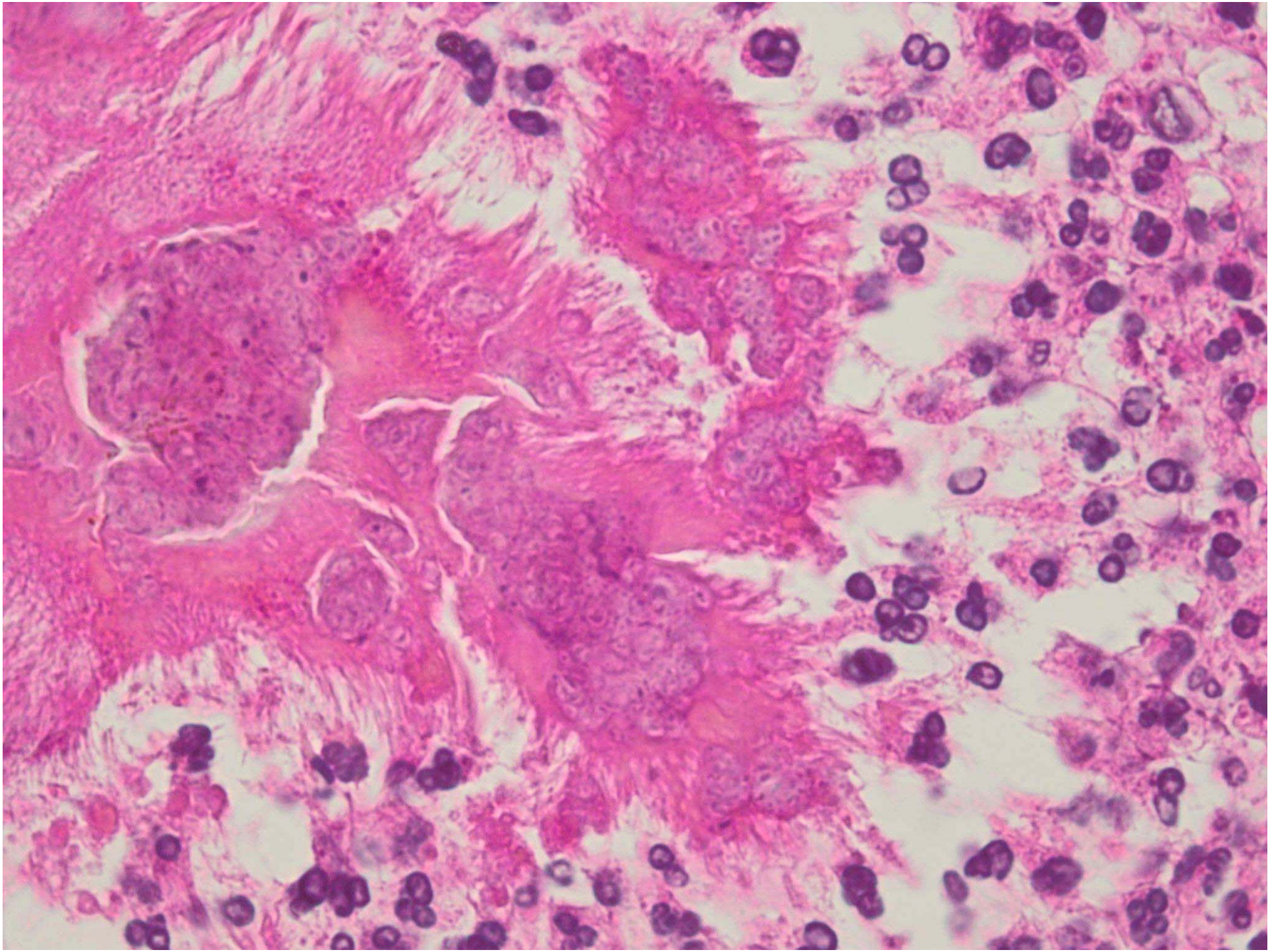

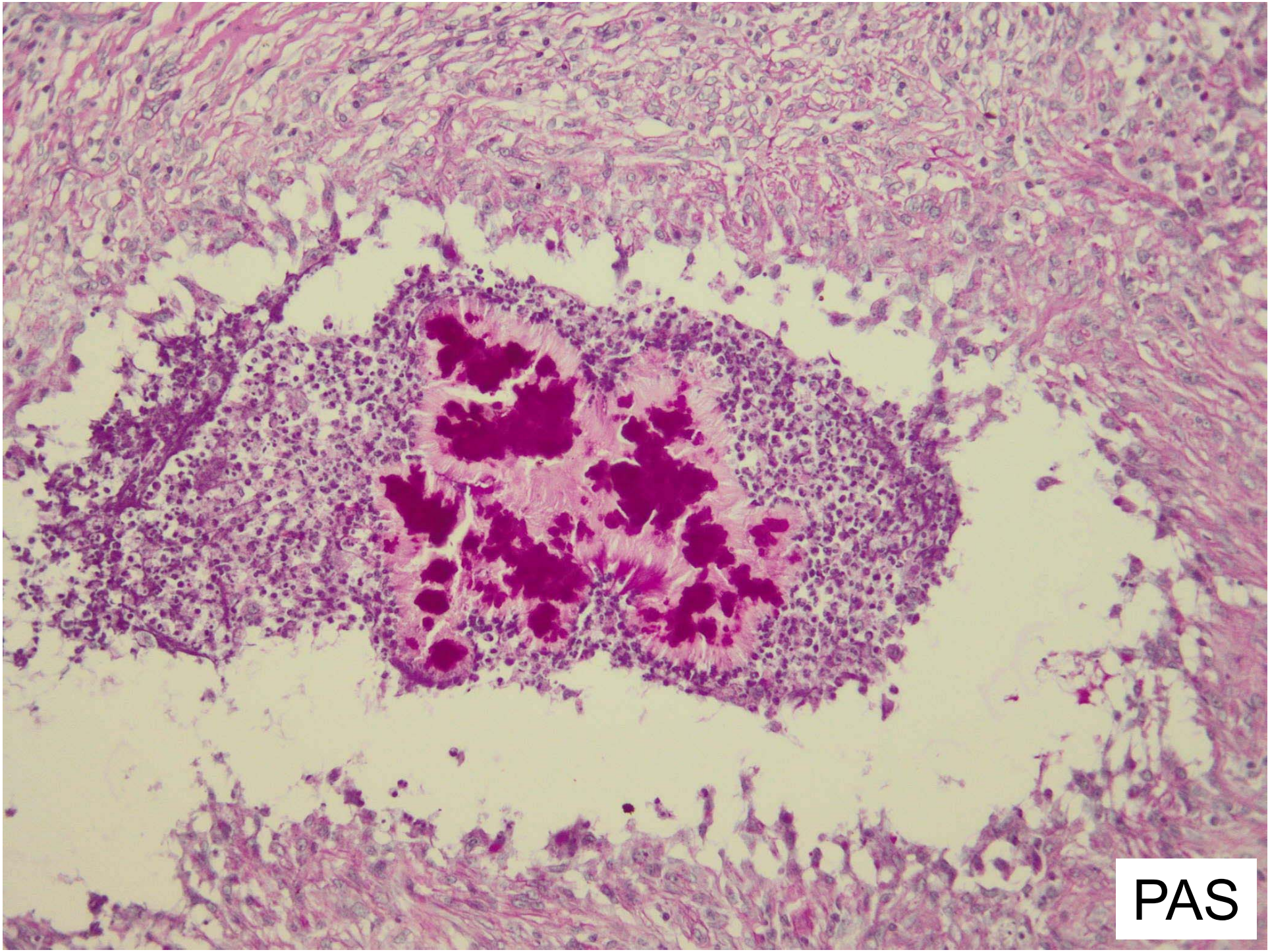
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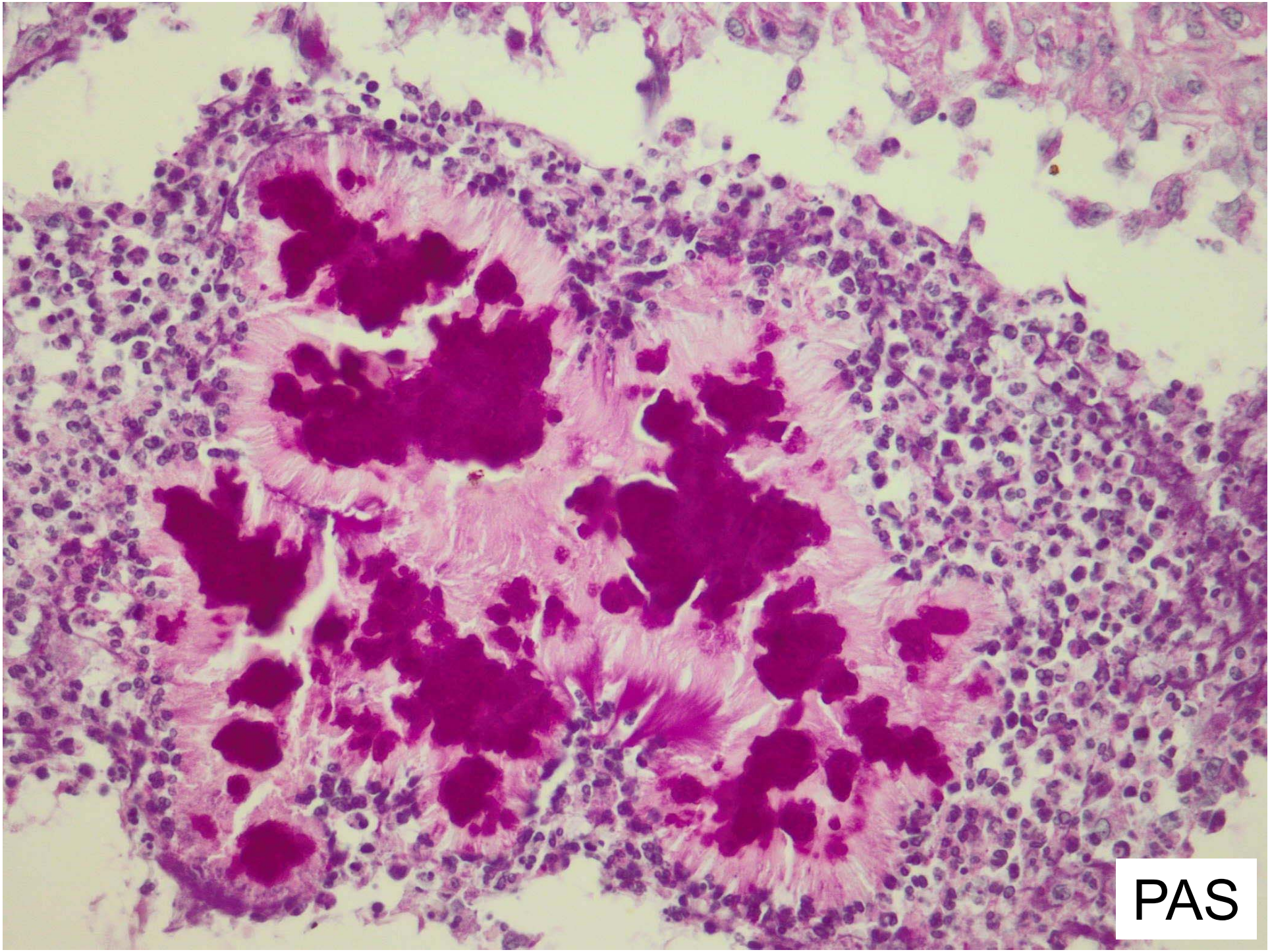
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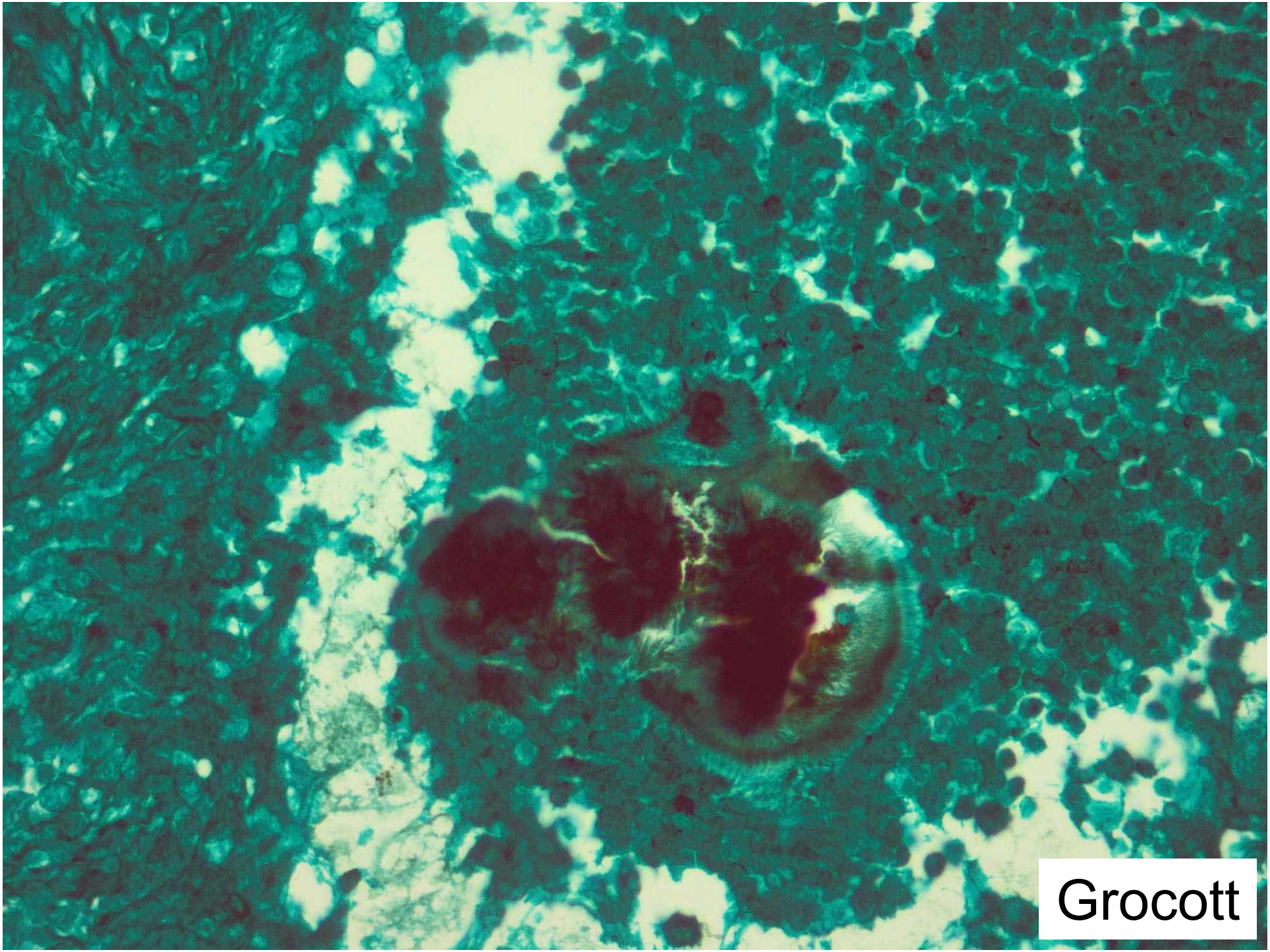
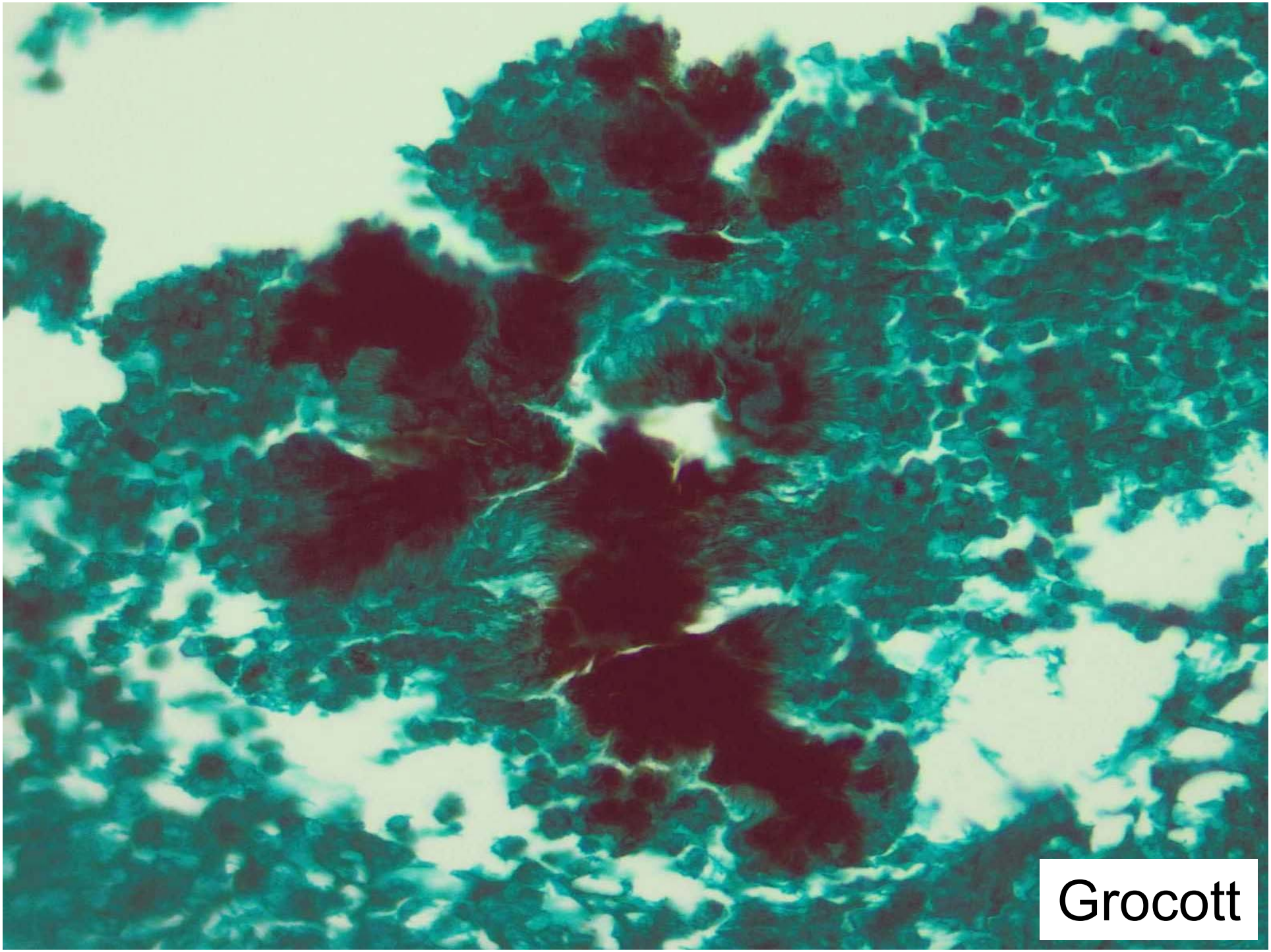

Grocott


Grocott

Fungal & bacterial culture:
Negative

Pan-fungal & pan-bacterial PCR:
Negative

Diagnosis

Eumycetic mycetoma

Mycetoma

- Localized, chronically discharging tumefactive infection of skin, subcutaneous soft tissue & sometimes bone
- Characterized by associated:
  - Multiple sinus tracts
  - Granules within inflammatory exudate

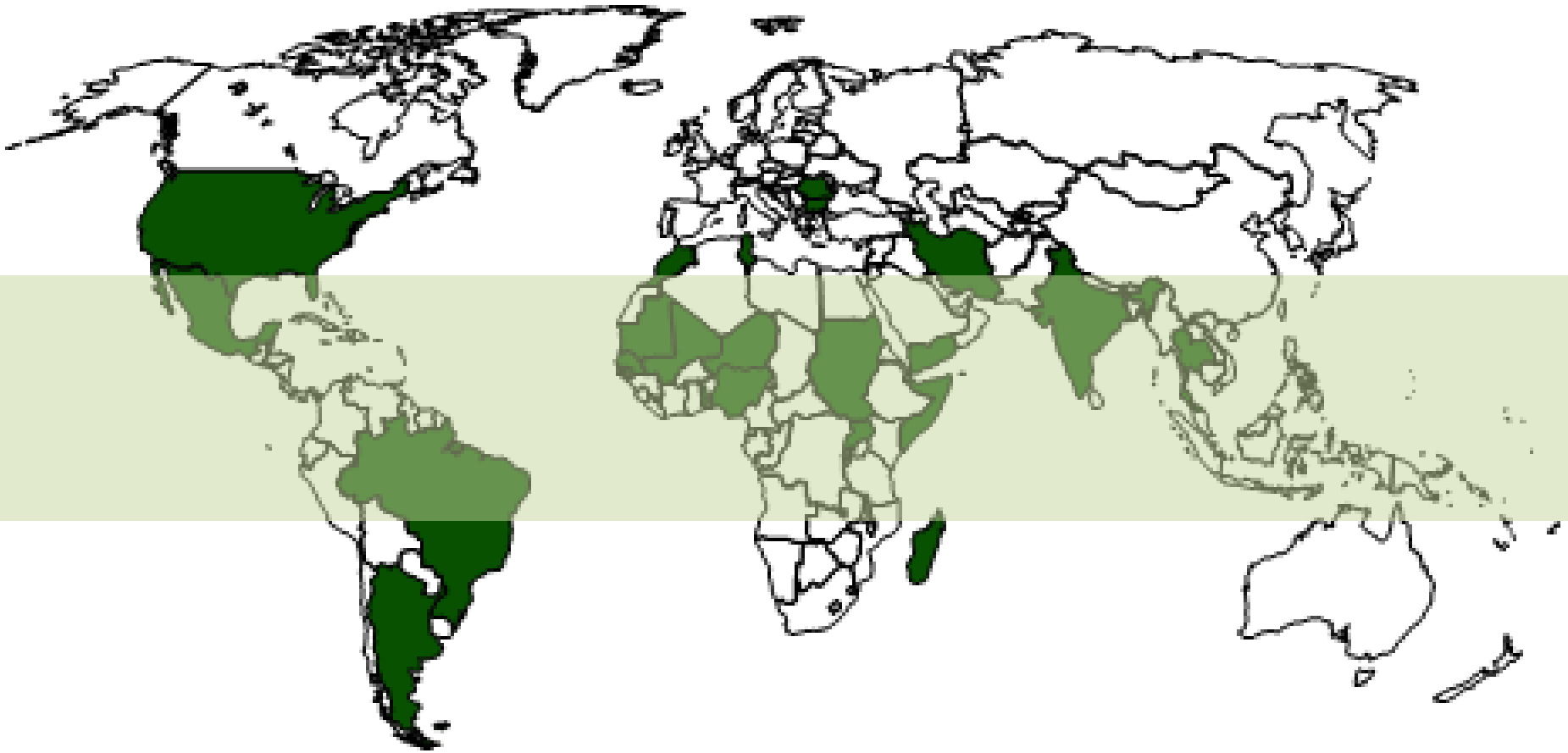
Mycetoma

- Caused by bacteria (actinomycetoma), or less commonly by fungi (eumycetoma)
- Foot = most common site
- Organisms present in soil & decaying plant matter
- Repeated inoculation by minor trauma

Mycetoma

EPIDEMIOLOGY

- ± Confined to tropical zones, between latitudes of 15° South & 30° North (so-called “mycetoma belt”)



Mycetoma

EPIDEMIOLOGY

- Peak age incidence = 20-50 yrs
- Marked male preponderance
- Often related to occupational injury

Mycetoma

CLINICAL ASPECTS

- Initially a papule, which enlarges to become a discharging nodule
- Extension to adjacent skin & soft tissue, with non-healing, discharging sinuses
- Distortion by inflammation & fibrosis
- May extend to involve underlying bone

By courtesy of Dr K. Mathekga, Dept of Dermatology, University of the Limpopo, South Africa

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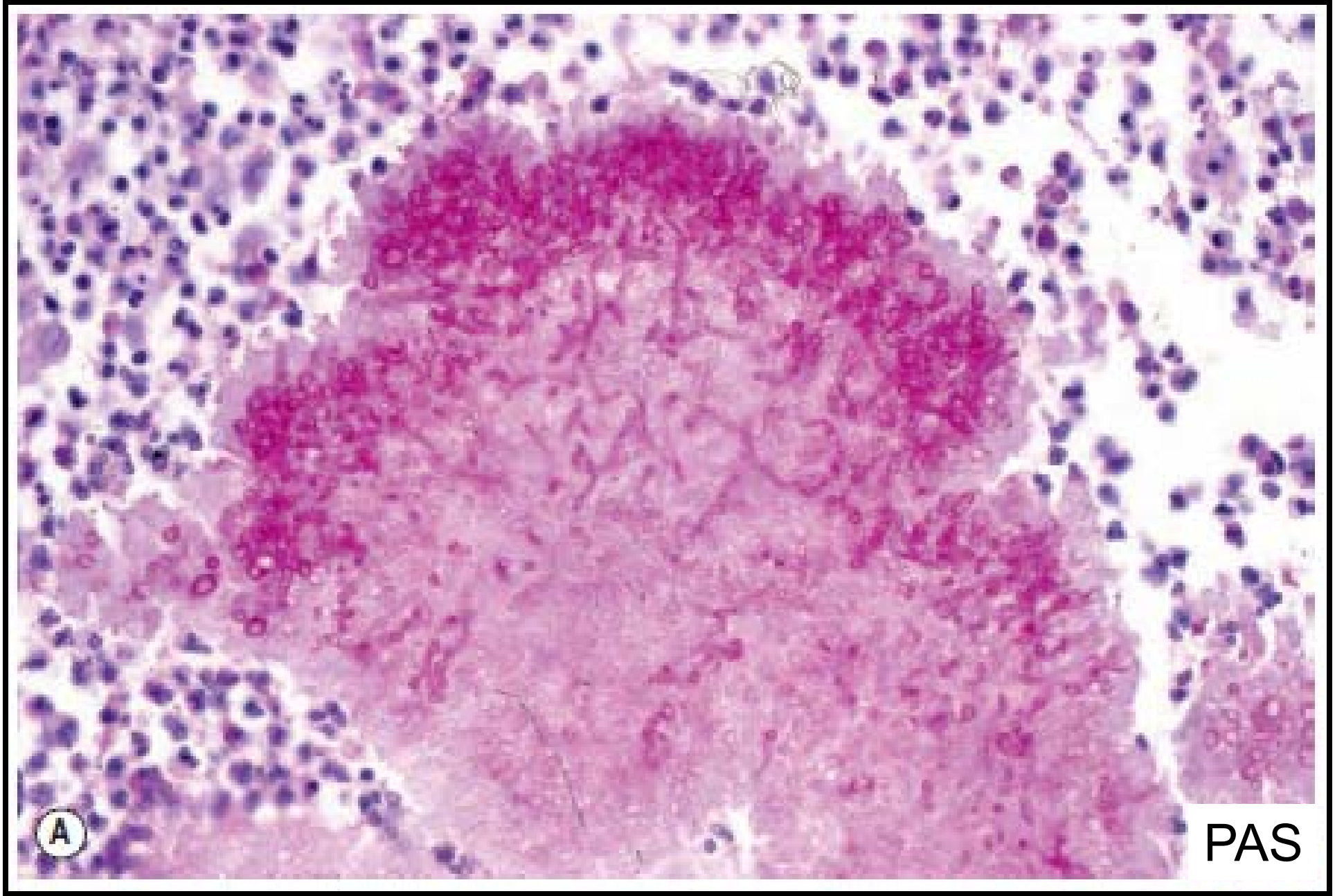
Eumycetoma

COMMON CAUSATIVE ORGANISMS

- *Madurella mycetomatis*
- *M. grisea*
- *Pseudoallescheria boydii*
- *Pyrenochaeta romeroi*
- *Leptosphaeria senegalensis*
- *Neotestudina rosatti*, etc.



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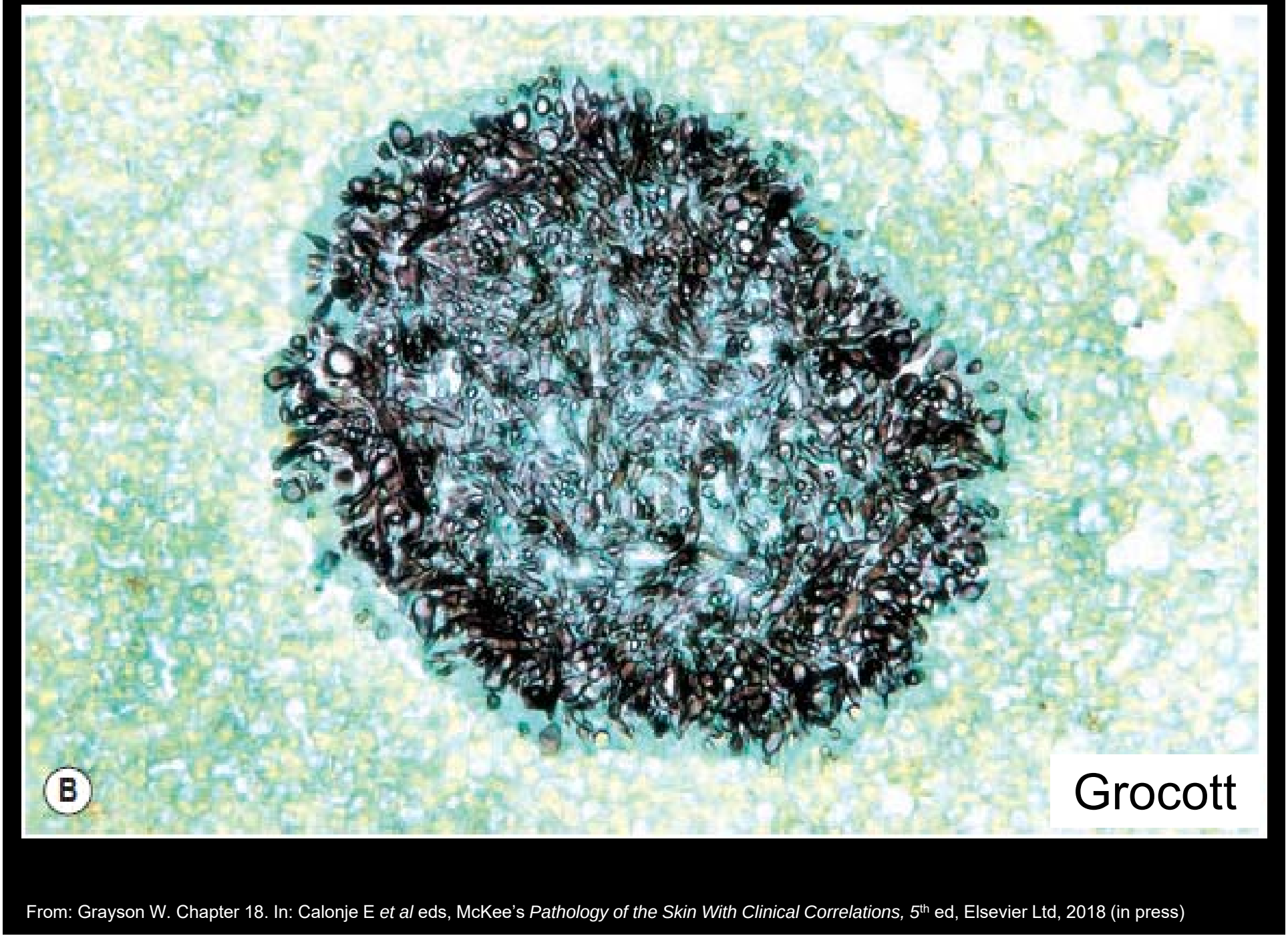

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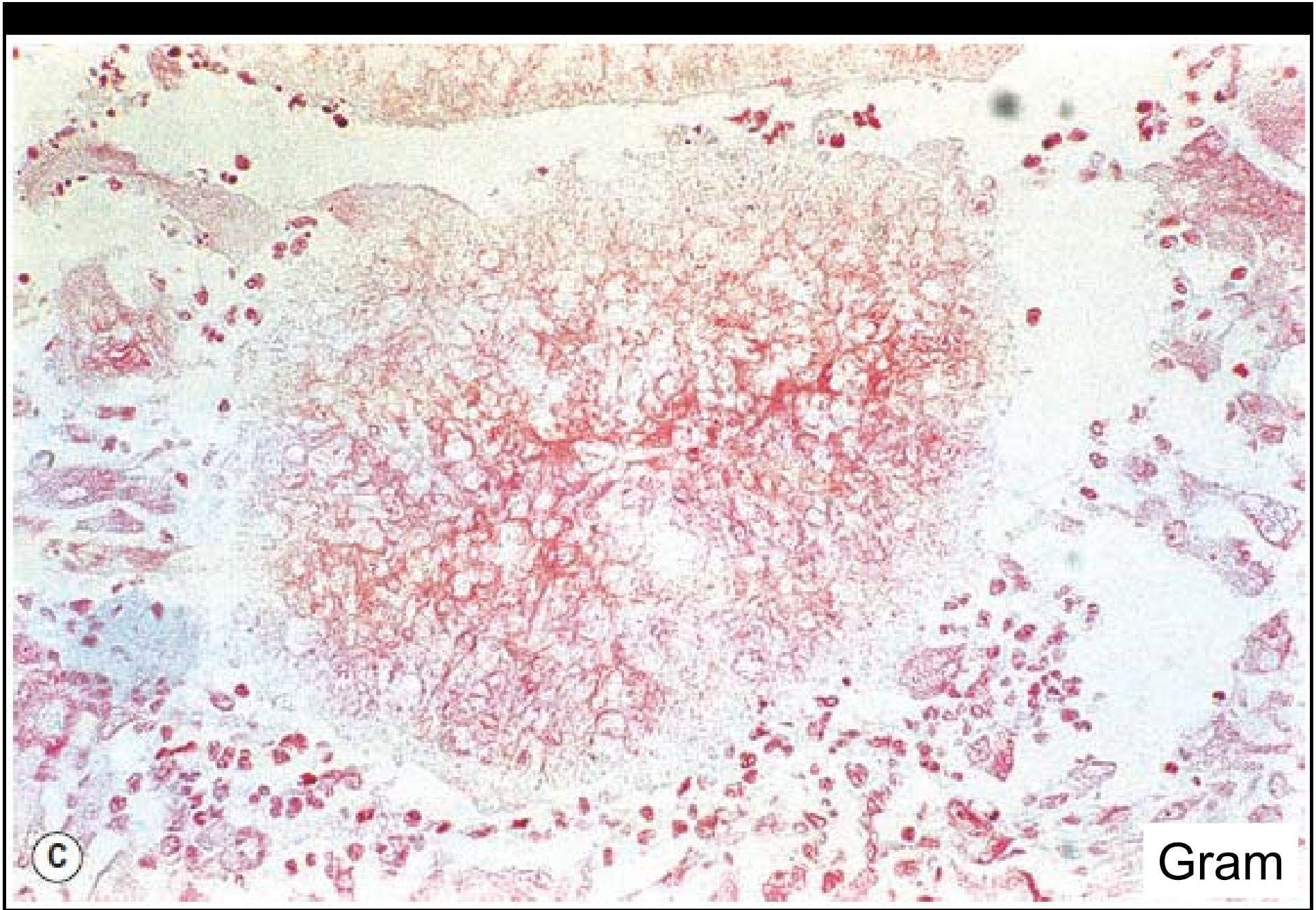

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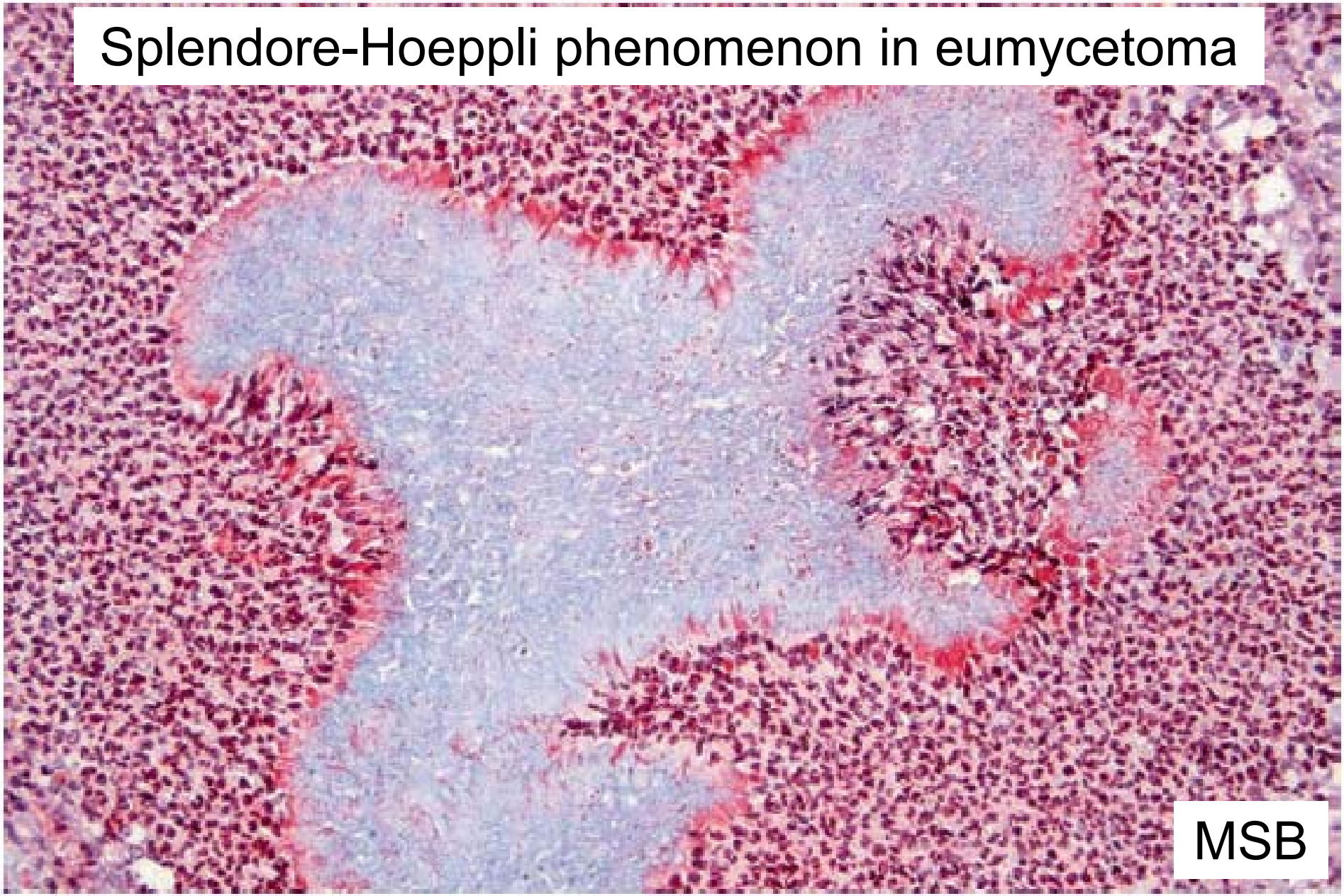
Splendore-Hoeppli phenomenon in eumycetoma



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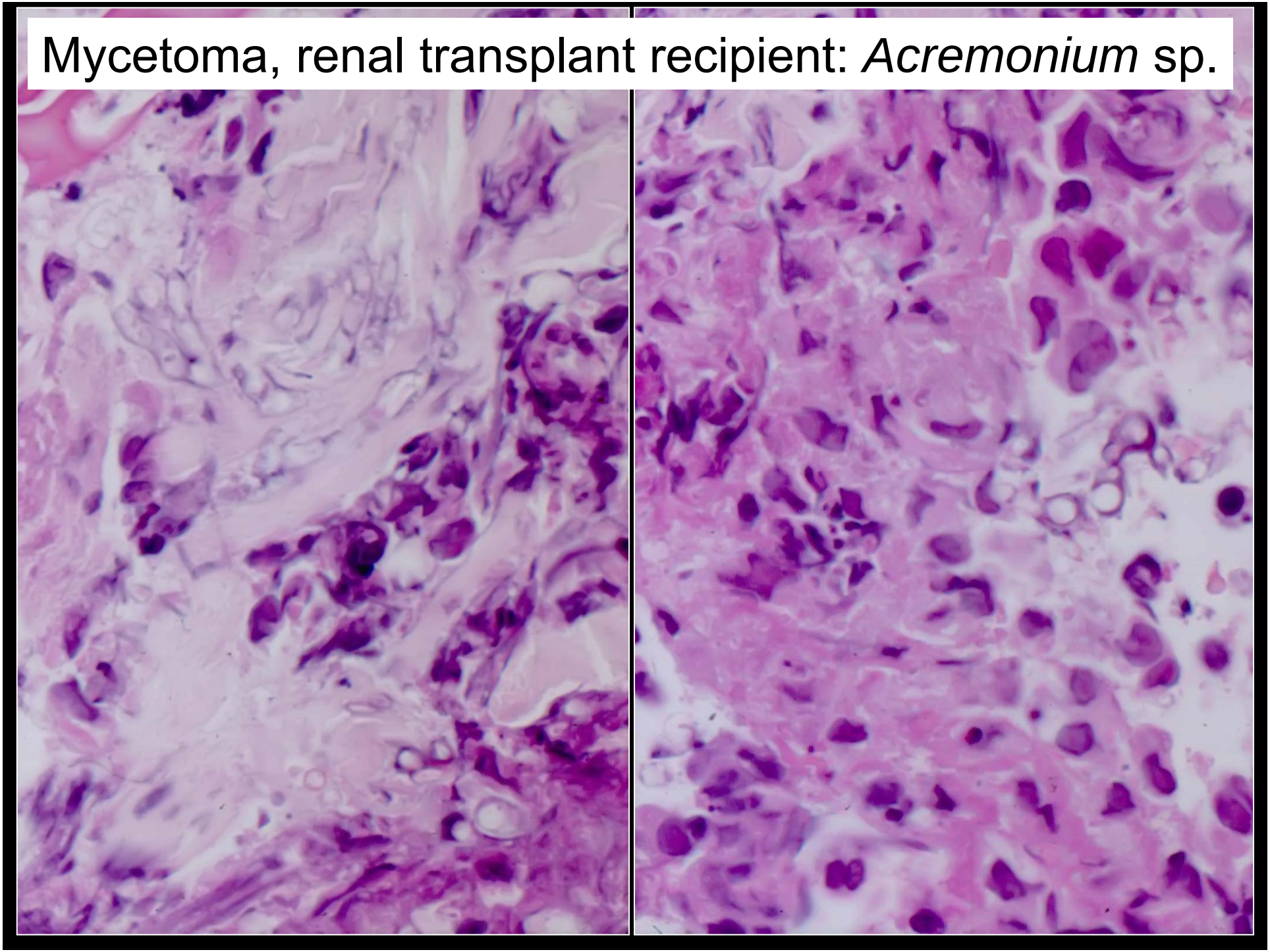
Eumycetoma

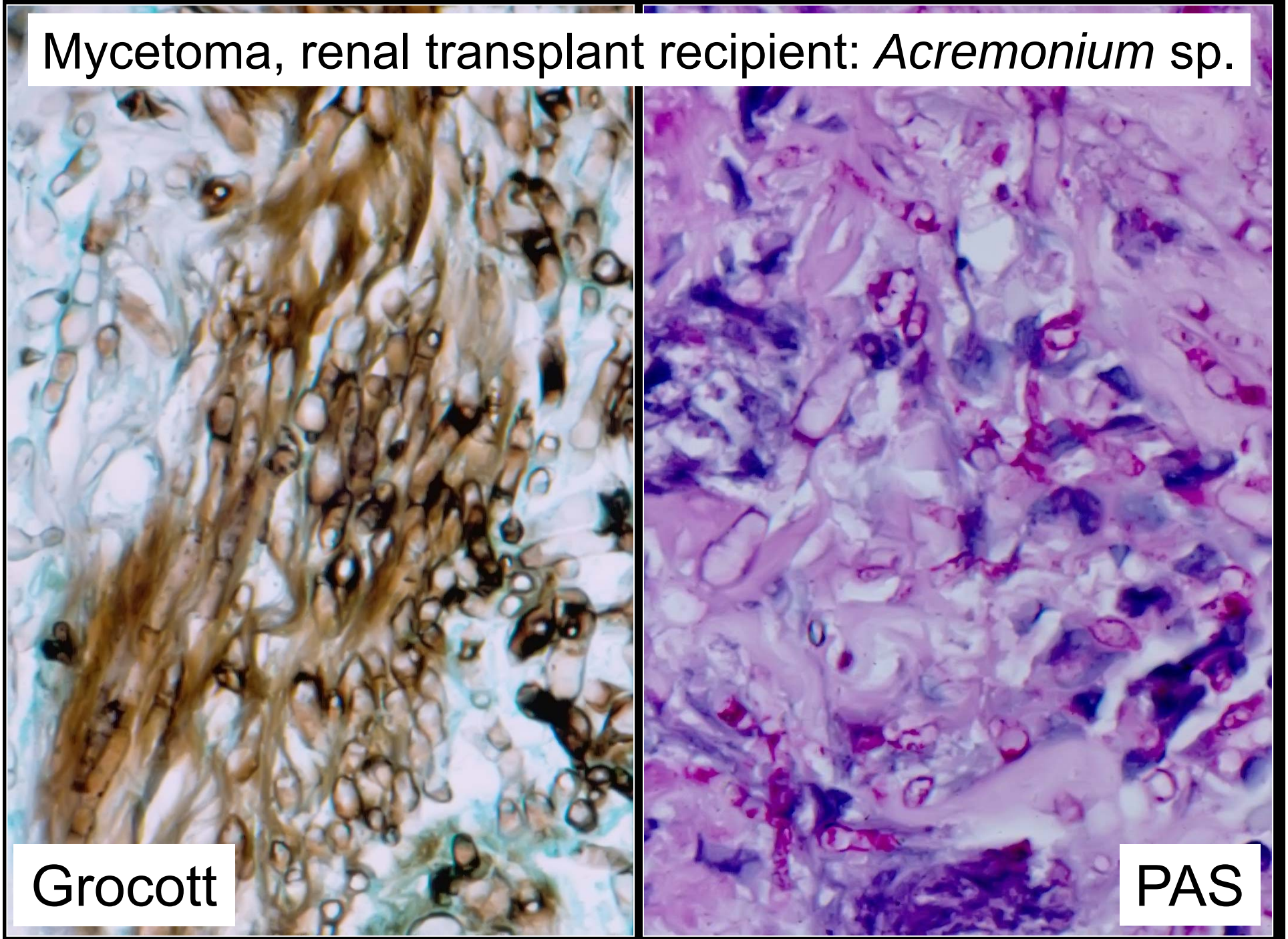
UNCOMMON CAUSATIVE ORGANISMS

- *Scedosporium apiospermum*
- *Cladophialophora bantiana*
- *Phaeoacremonium fuscum*
- *Diaporthe phaseolorum*, etc.

Mycetoma, renal transplant recipient: *Acremonium* sp.



Mycetoma, renal transplant recipient: *Acremonium* sp.



Actinomycetoma

COMMON CAUSATIVE ORGANISMS

- *Nocardia* sp.
- *Actinomyces* sp.
- *Streptomyces* sp.

Mycetoma d/t *Actinomyces* sp.

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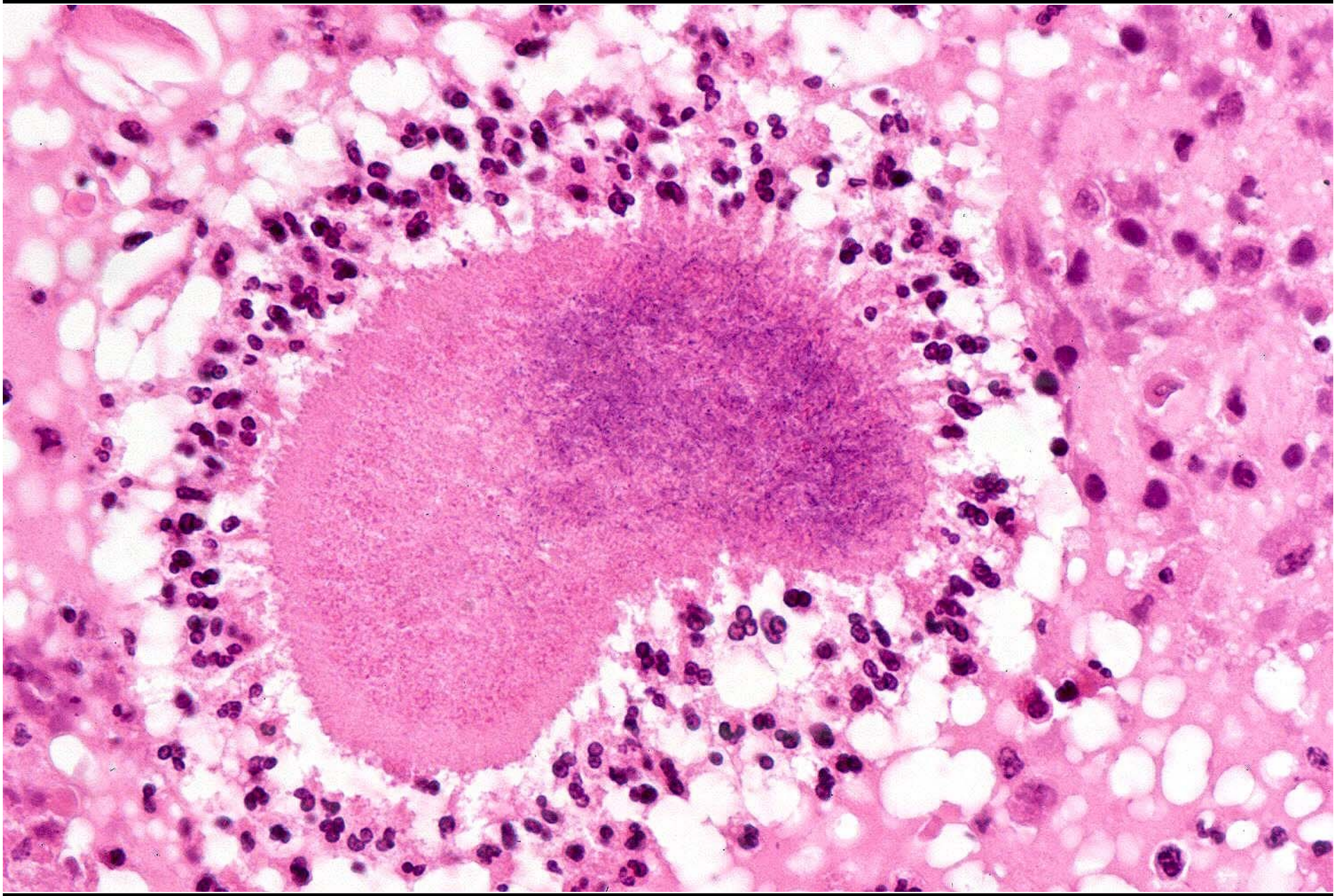

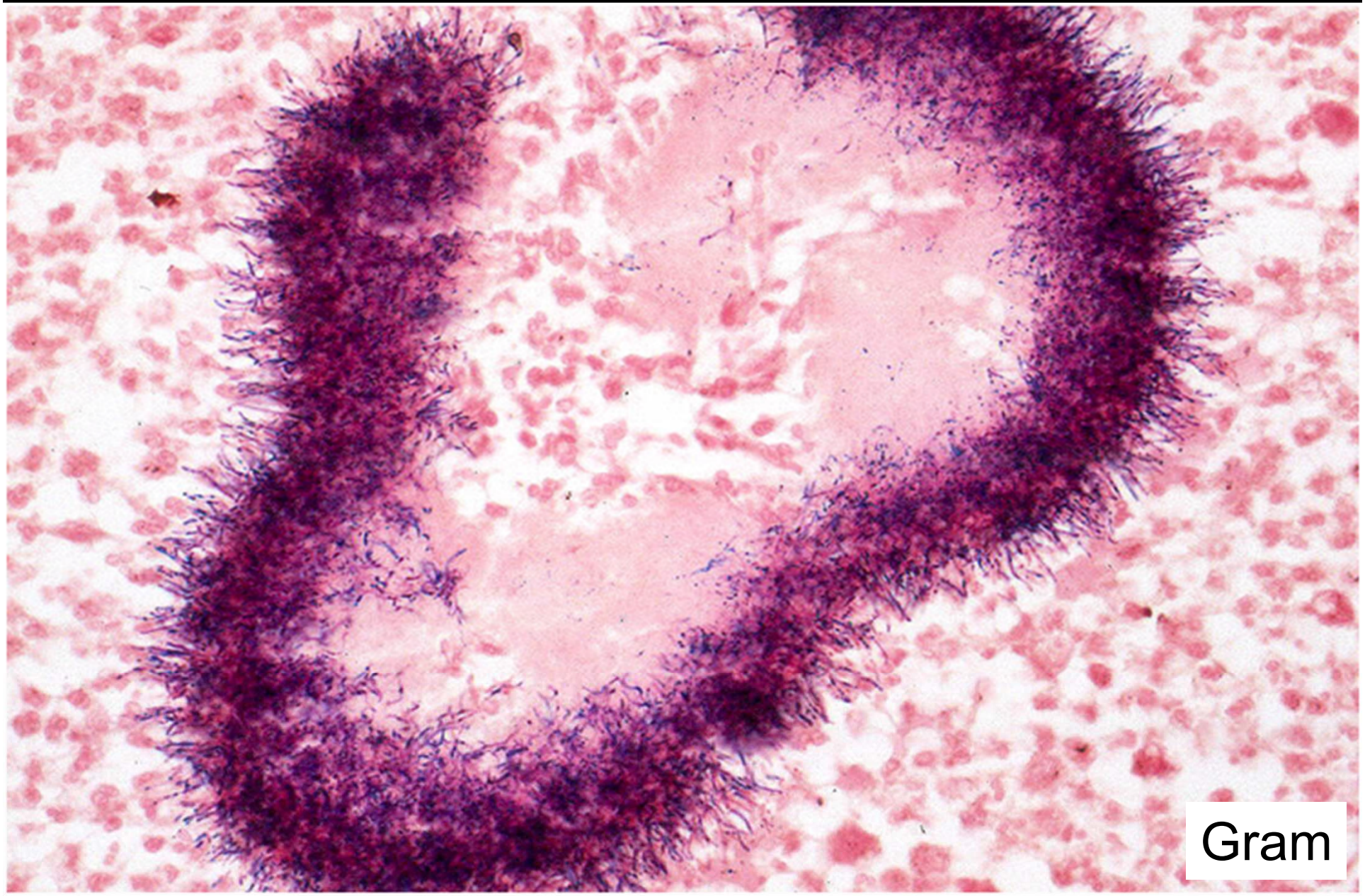

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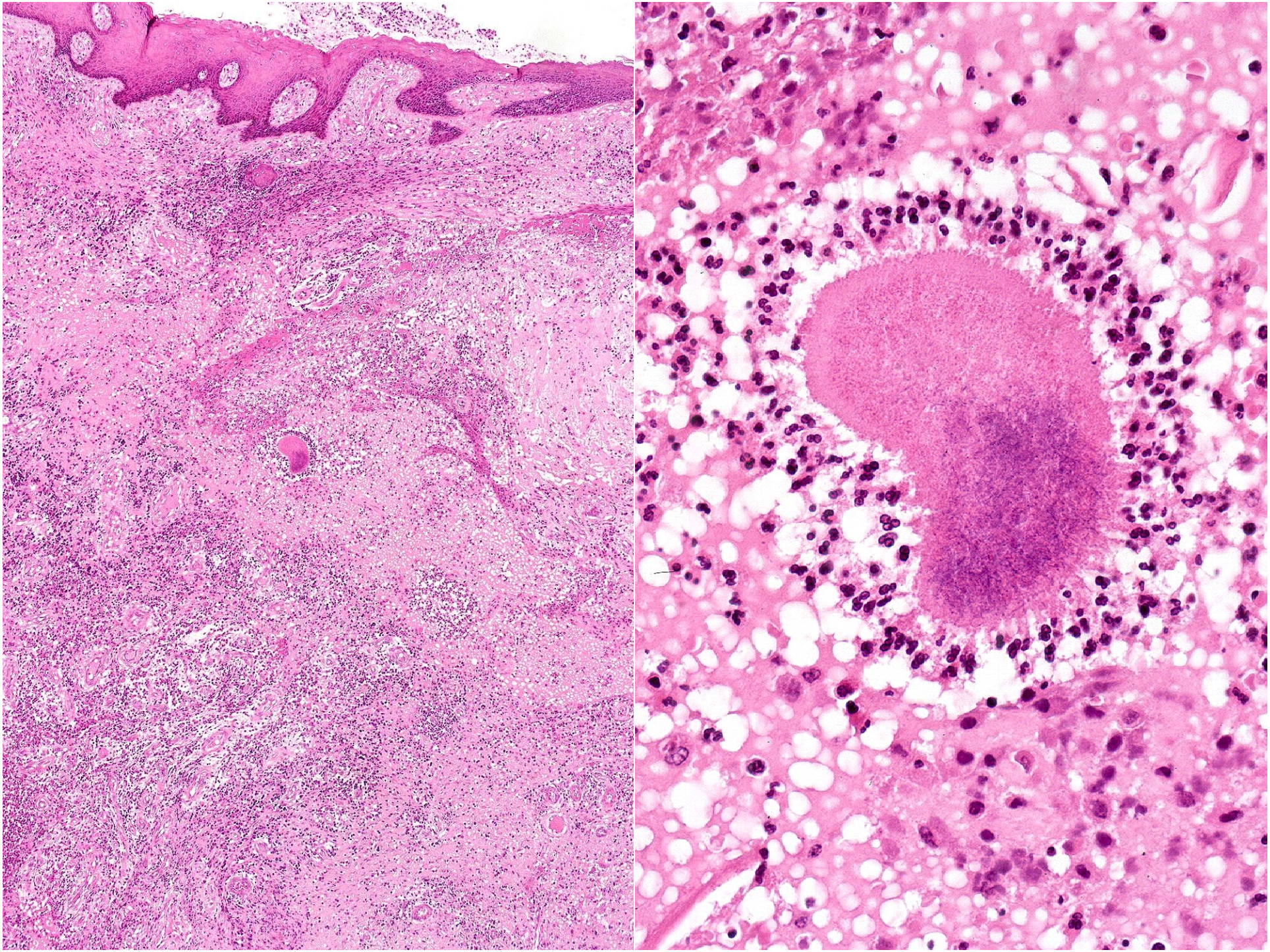
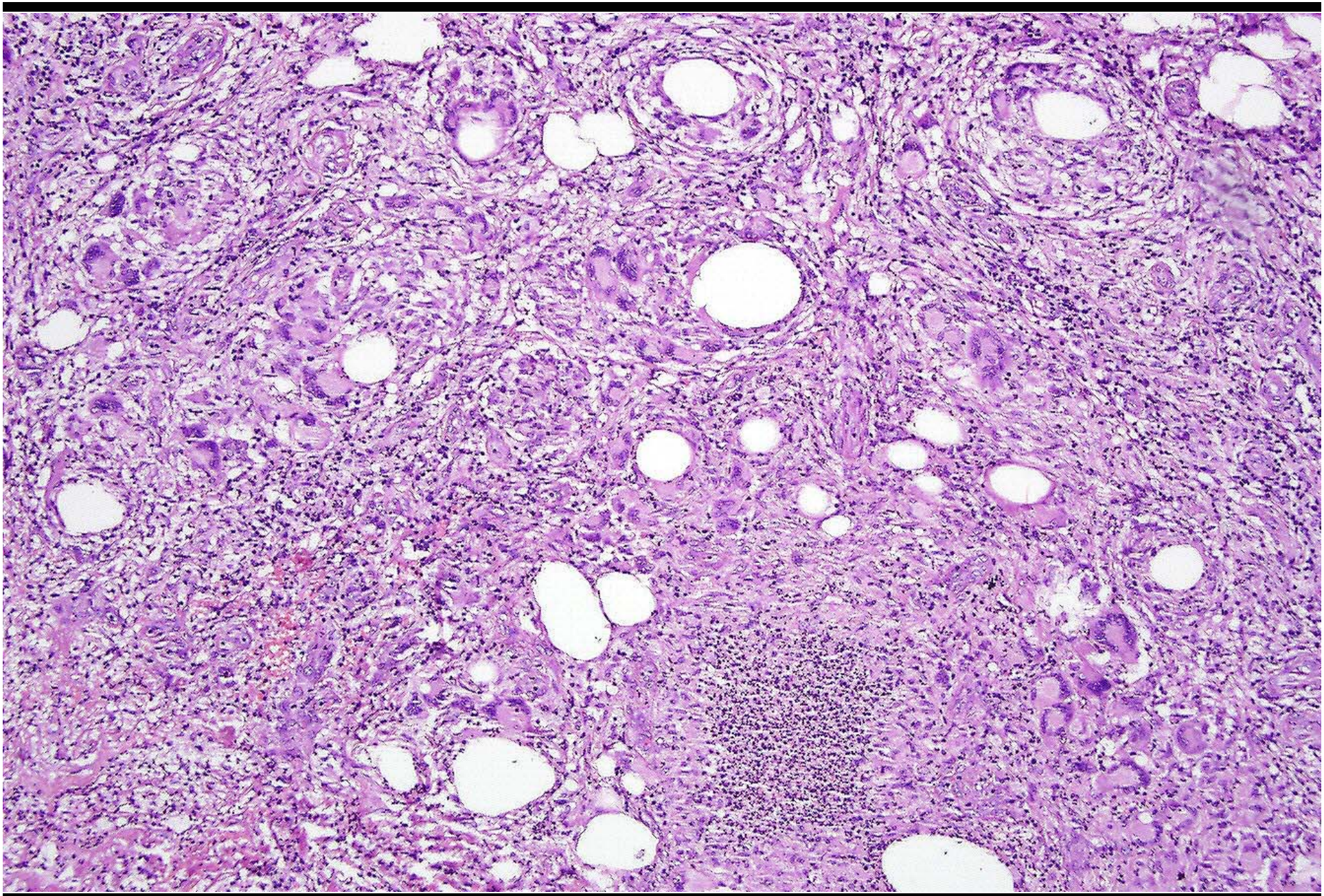
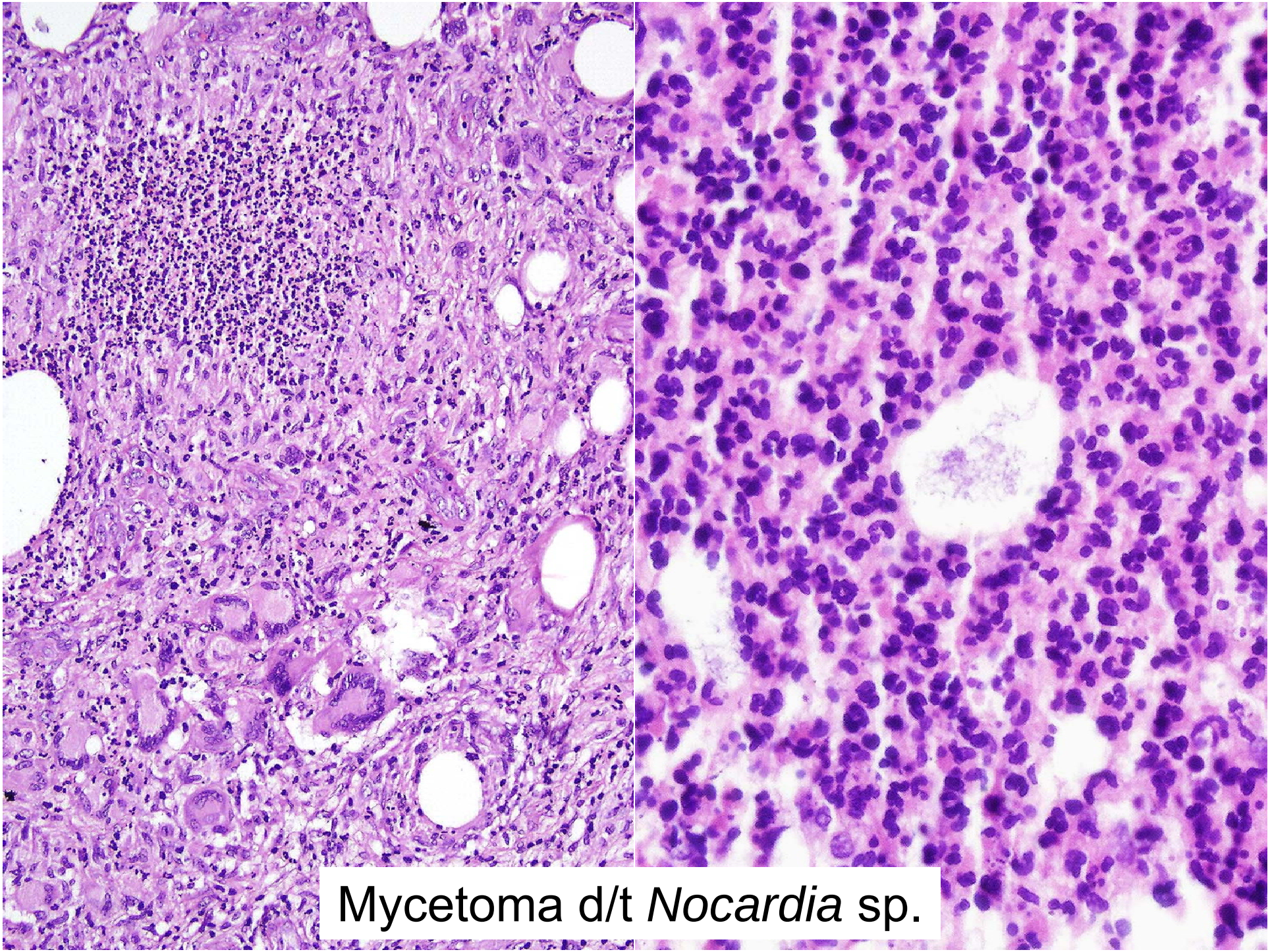
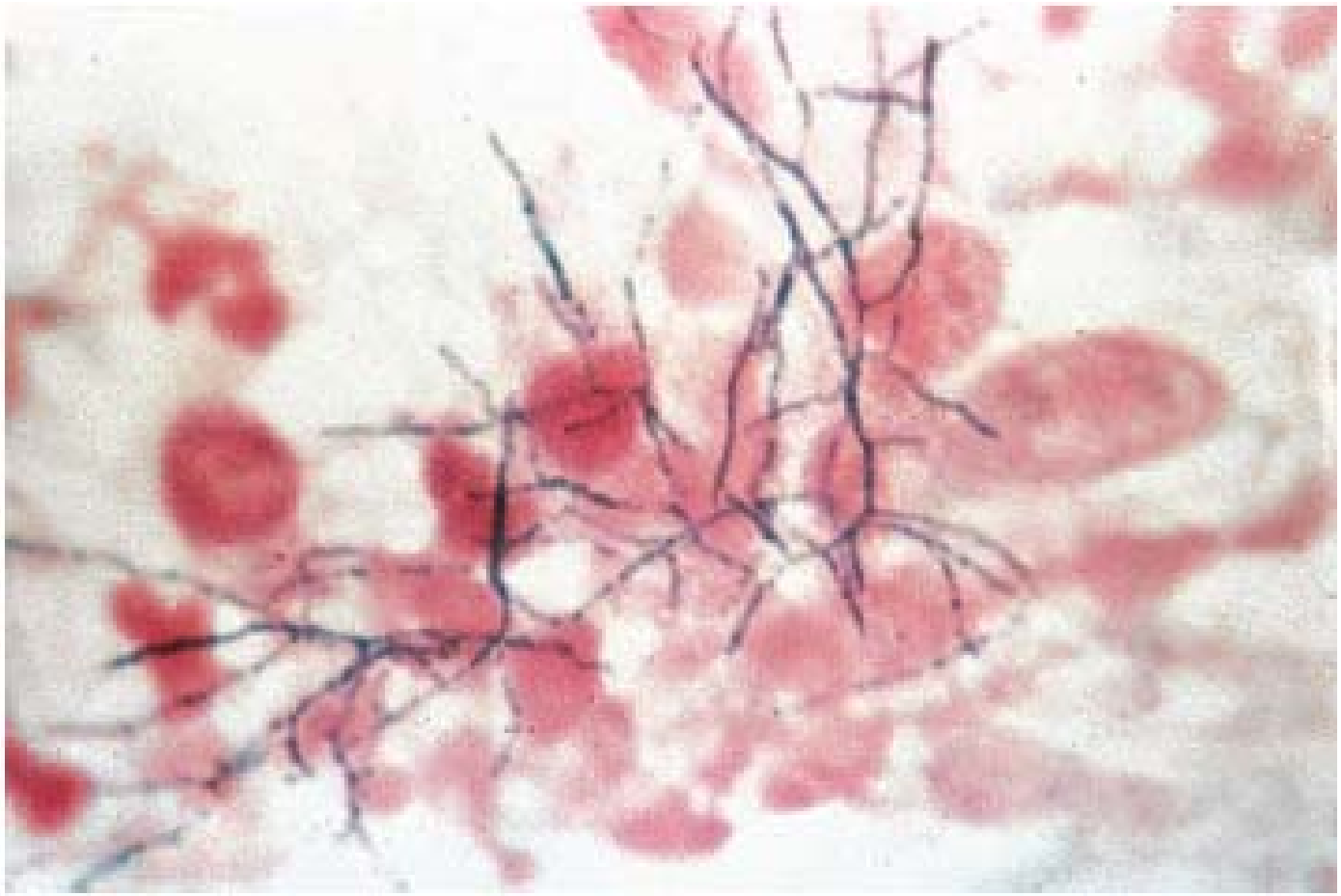




Mycetoma d/t *Nocardia* sp.



Mycetoma d/t *Nocardia* sp.



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Mycetoma

IDENTIFICATION BY GRANULE COLOUR

Table 18.3
Color of granules in mycetoma

	Maduromycotic (eumycetic)	Actinomycetic
Black	*Madurella mycetomatis* *Madurella grisea* *Pyrenochaeta romeroi* *Phialophora jeanselmei* *Leptosphaeria senegalensis* *Leptosphaeria tompkinsii*	
Yellow or yellowish-white	*Allescheria boydii* *Acremonium* sp. *Fusarium* sp. *Neotestudina rosatti* *Actinomadura madurae* *Streptomyces somaliensis*	
Red		*Actinomadura pelletieri*
White or not visible		*Nocardia brasiliensis* *Nocardia caviae* *Nocardia asteroides*

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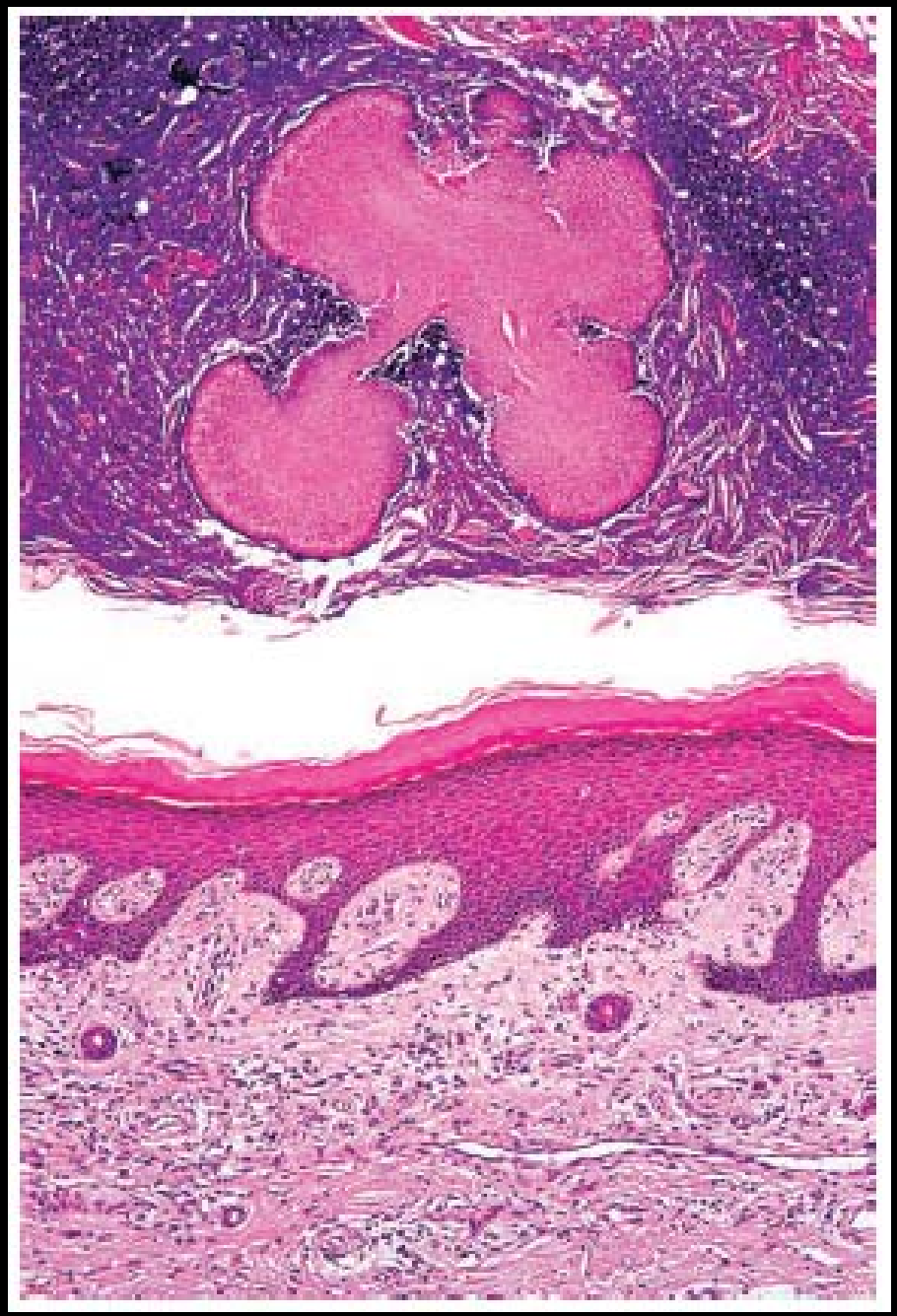

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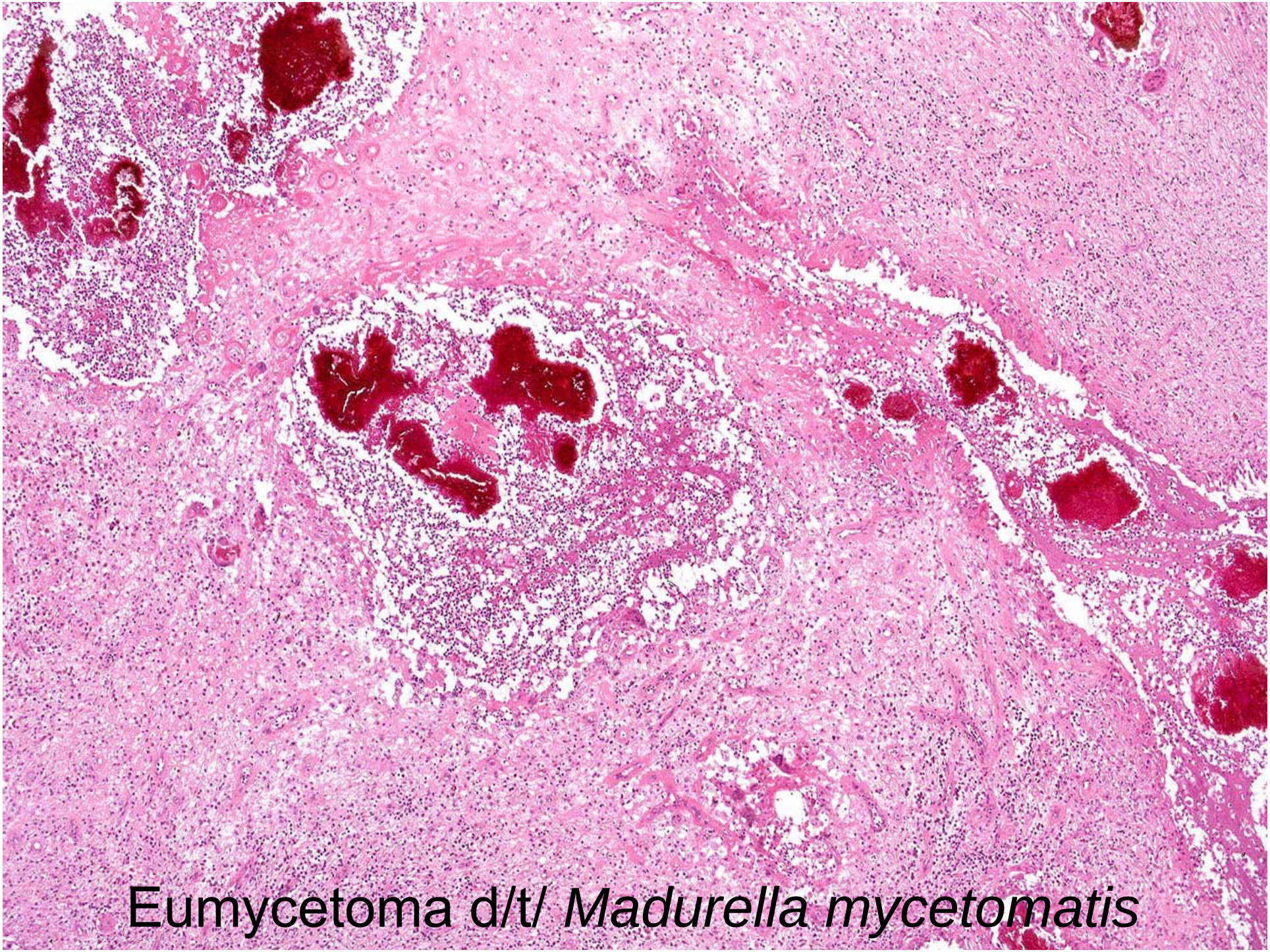
Eumycetoma d/t/ *Madurella mycetomatis*

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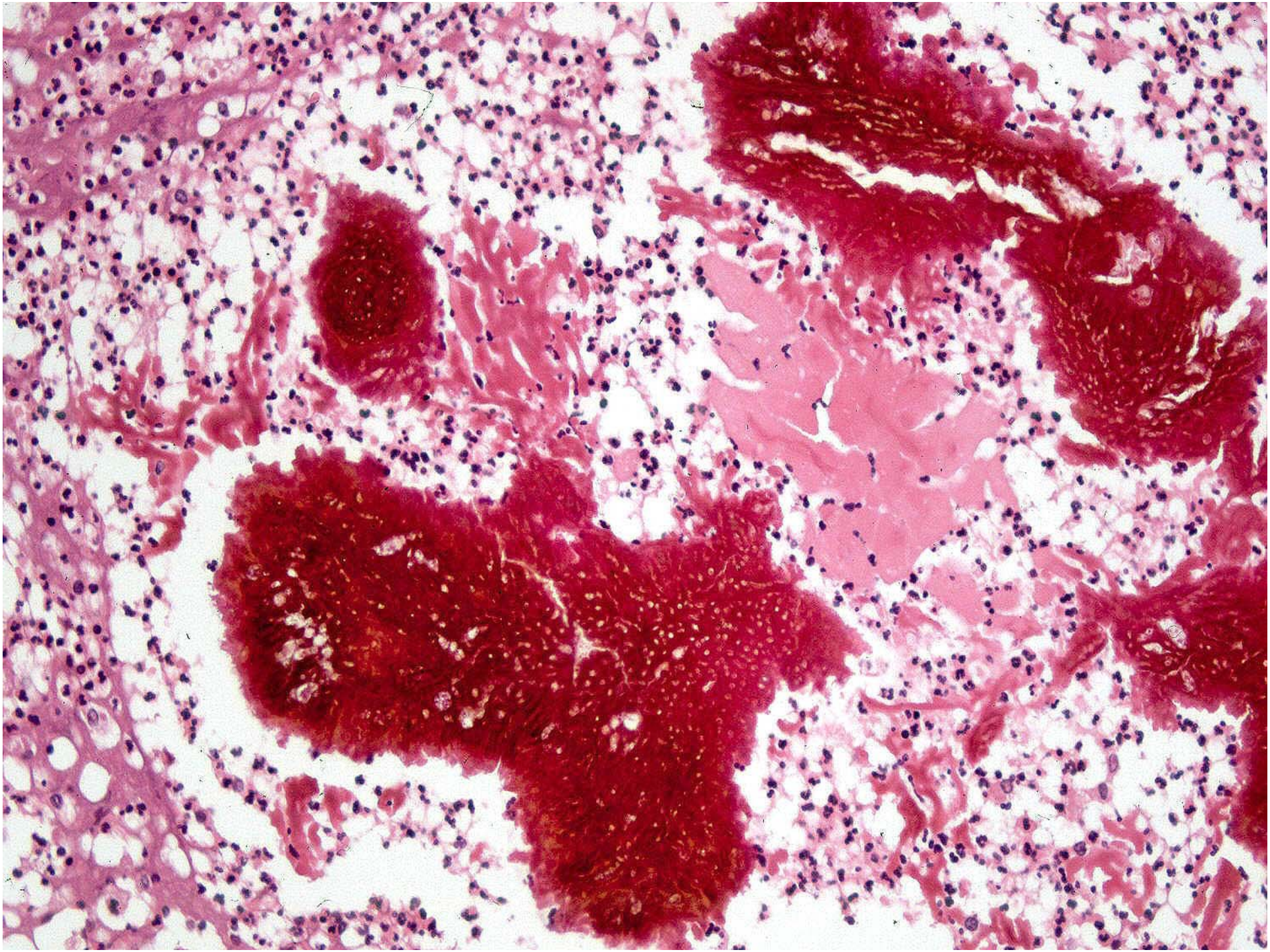

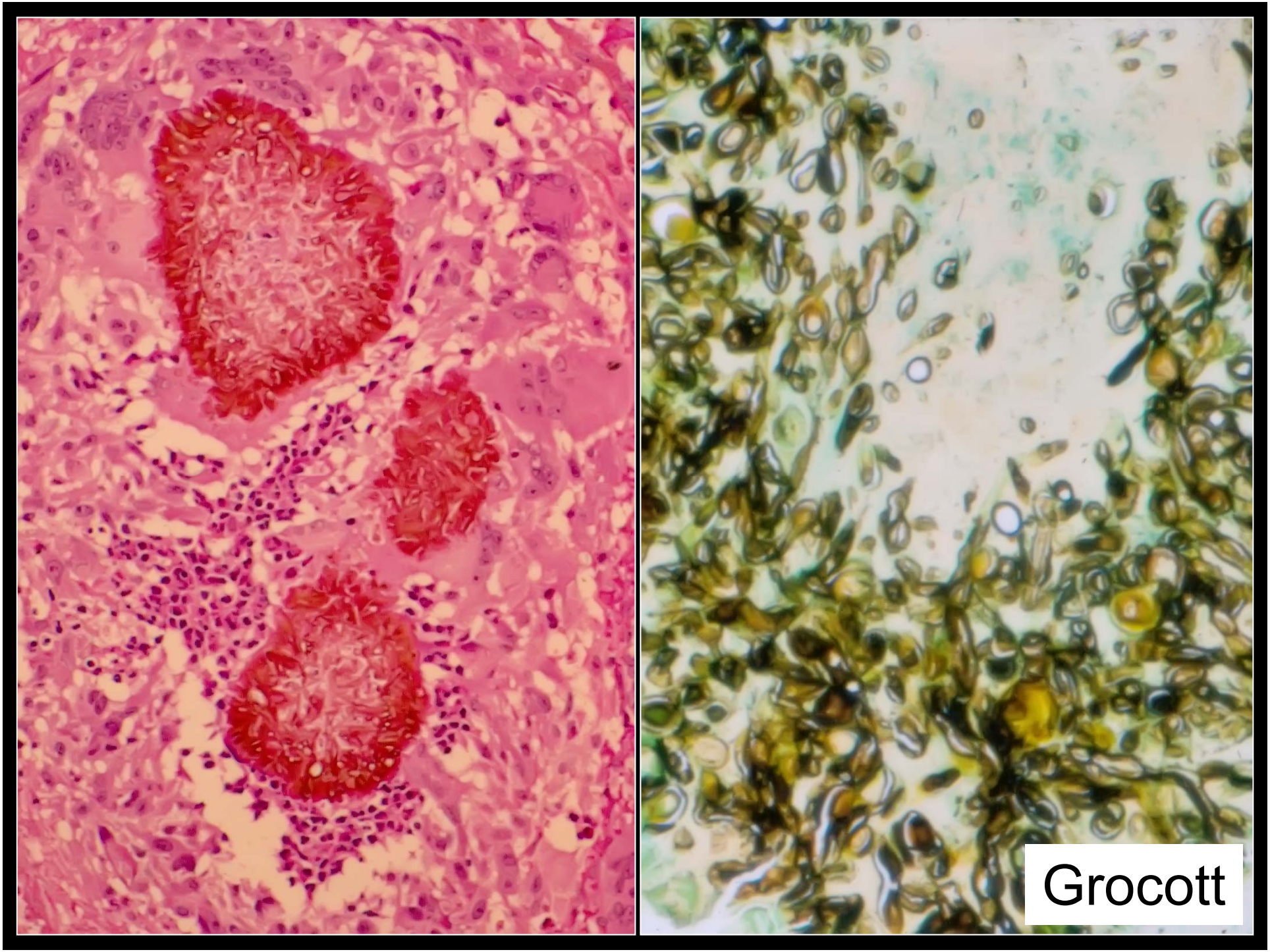
Grocott

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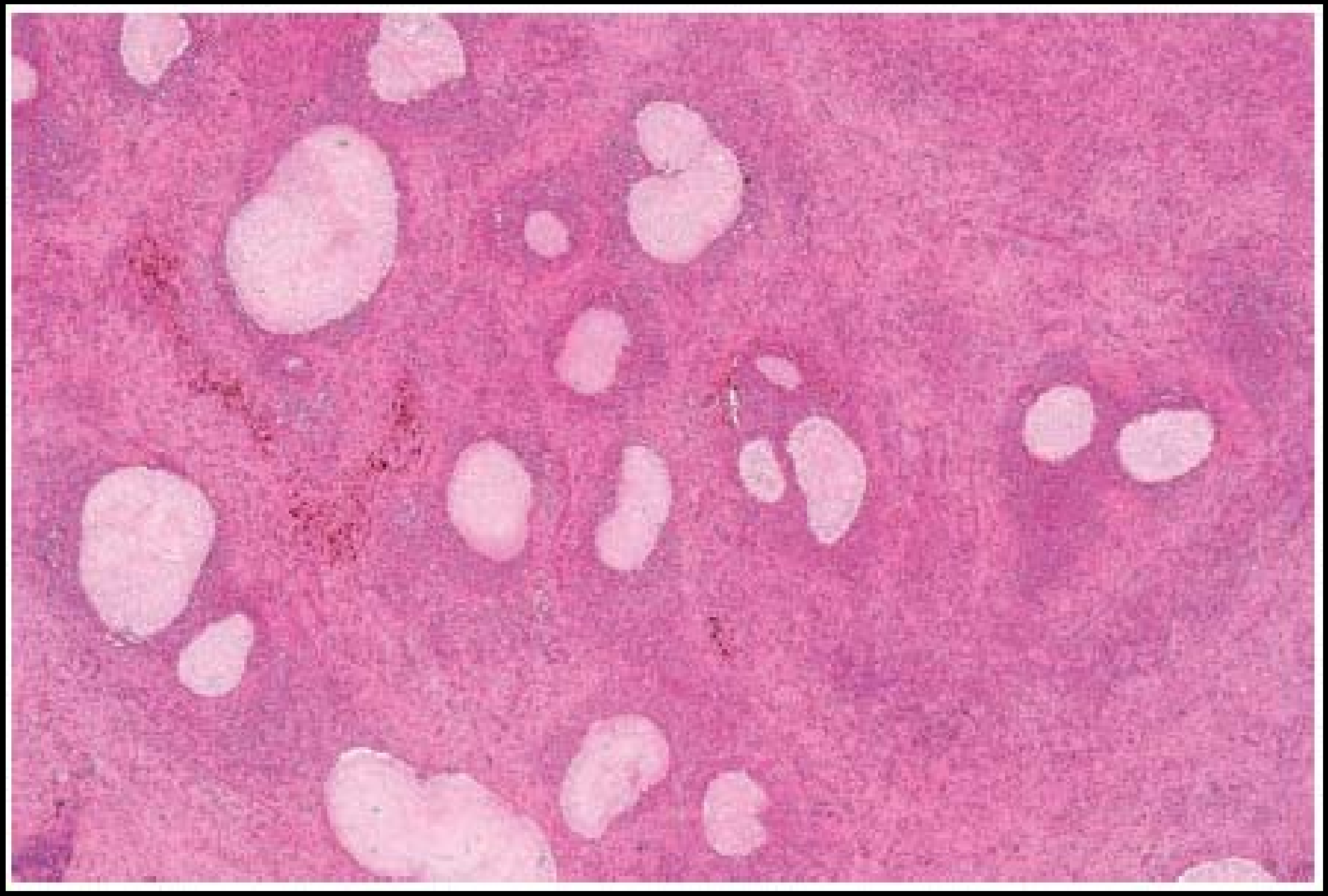

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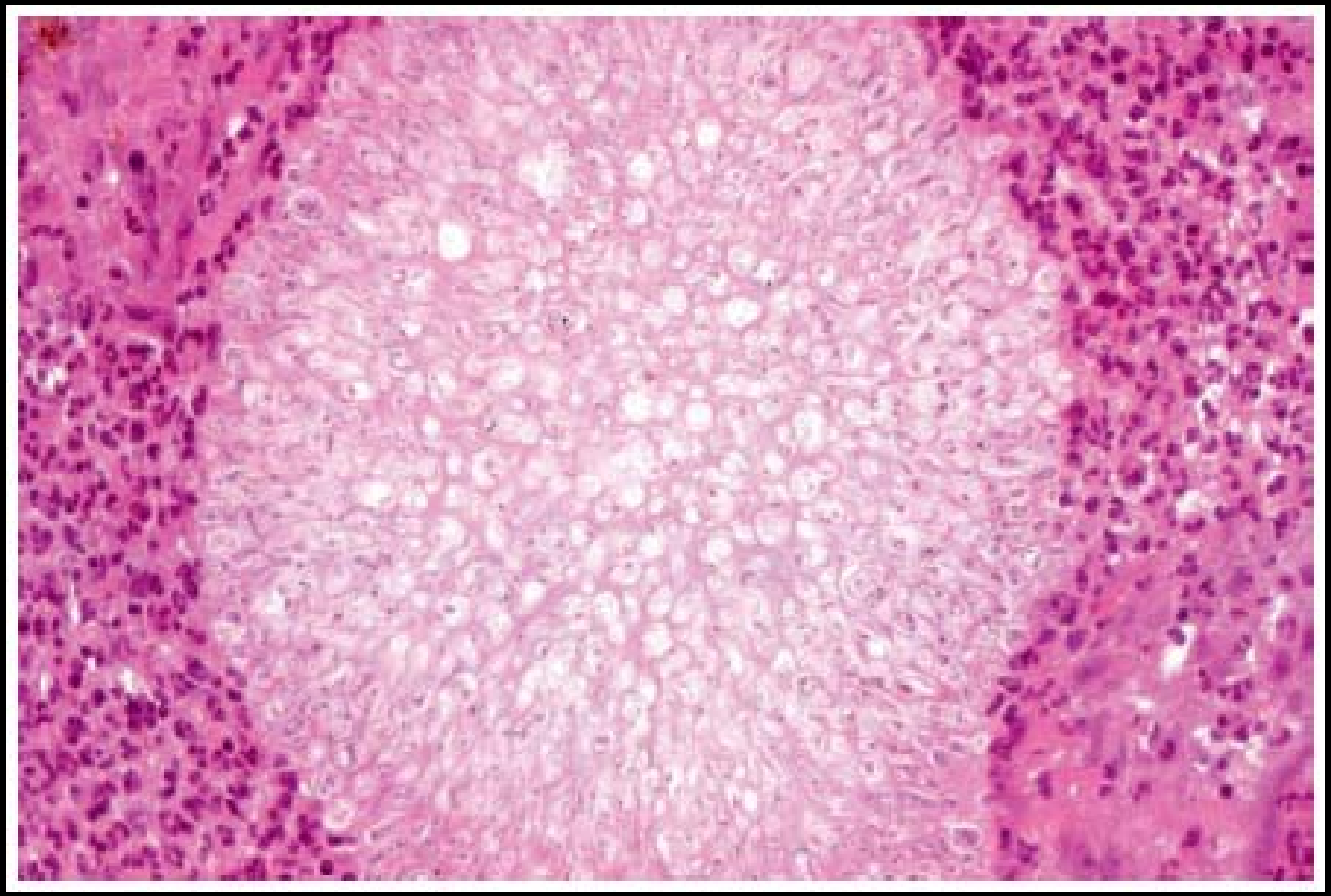

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Mycetoma

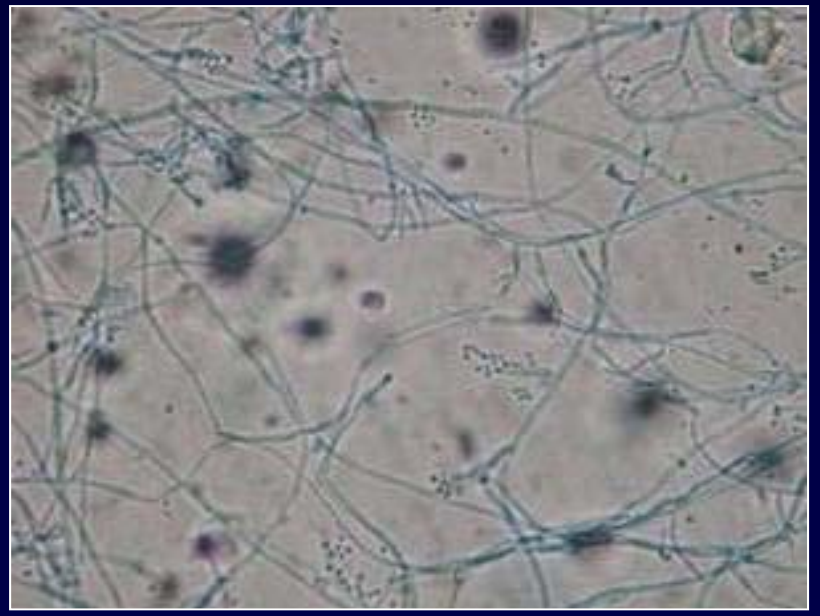
DIAGNOSIS

- **PAS** stain: +ve in eumycetoma; -ve in actinomycetoma
- **Grocott** stains: +ve in eumycetoma, but remember that bacteria also +ve
- **Gram** stain: +ve in actinomycetoma; -ve in eumycetoma
- **Z-N**: +ve in *Nocardia* infection

Mycetoma

DIAGNOSIS

- Bacterial & fungal culture studies
- PCR studies for bacteria & fungi



Mycetoma

DIFFERENTIAL DIAGNOSIS

1. BOTRYOMYCOSIS
   - A.k.a bacterial pseudomycosis
   - Chronic suppurative nodules & interconnecting fistulae
   - Common sites = hands, feet, head
   - *Staphylococcus aureus* = commonest causative agent

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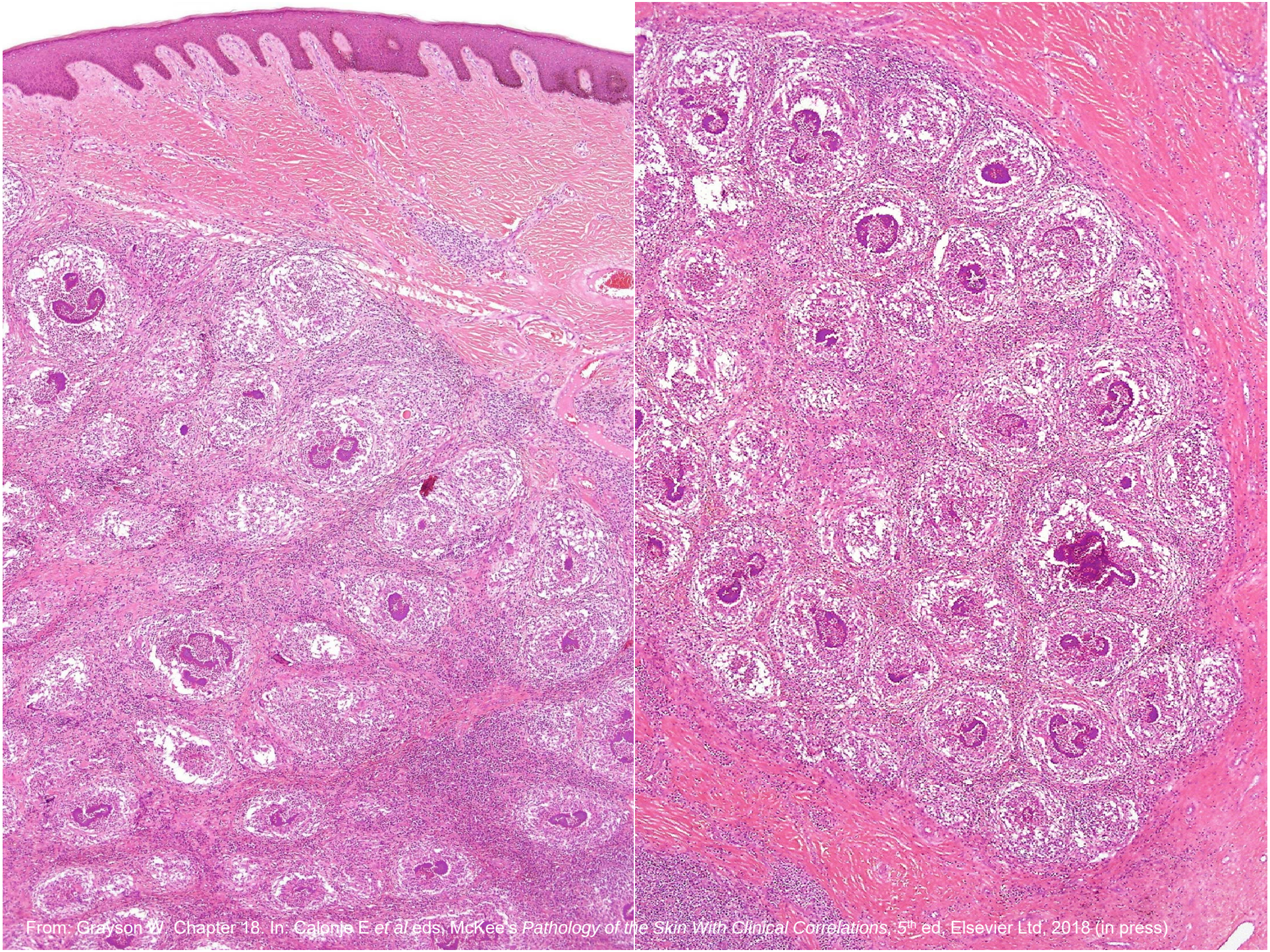
Mycetoma

DIFFERENTIAL DIAGNOSIS

1. BOTRYOMYCOSIS
   - Other aetiological agents:
     - *Pseudomonas* spp.
     - *Eschereschia coli*
     - *Proteus* spp.
     - *Micrococcus* spp.
     - *Streptococcus* spp.



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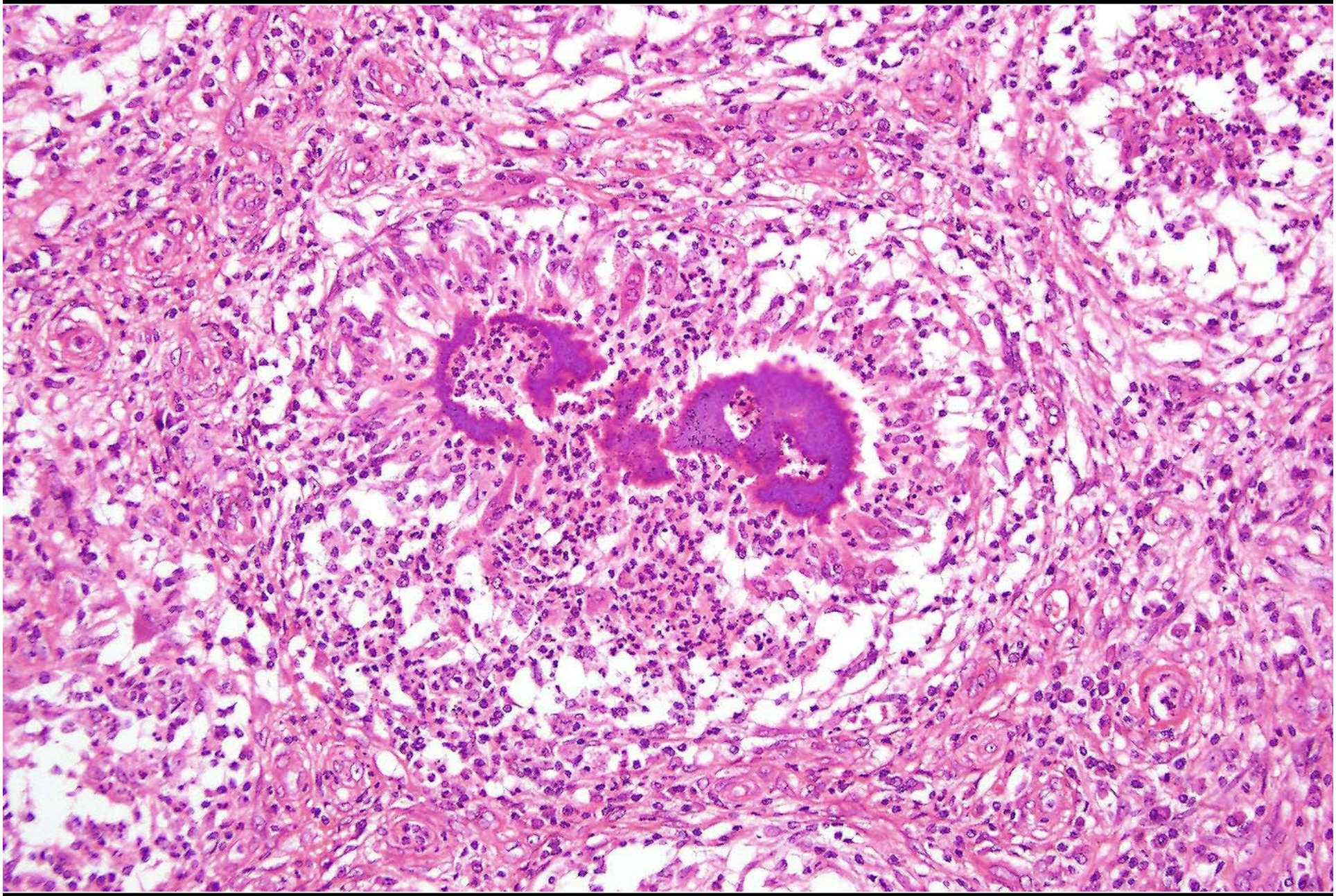

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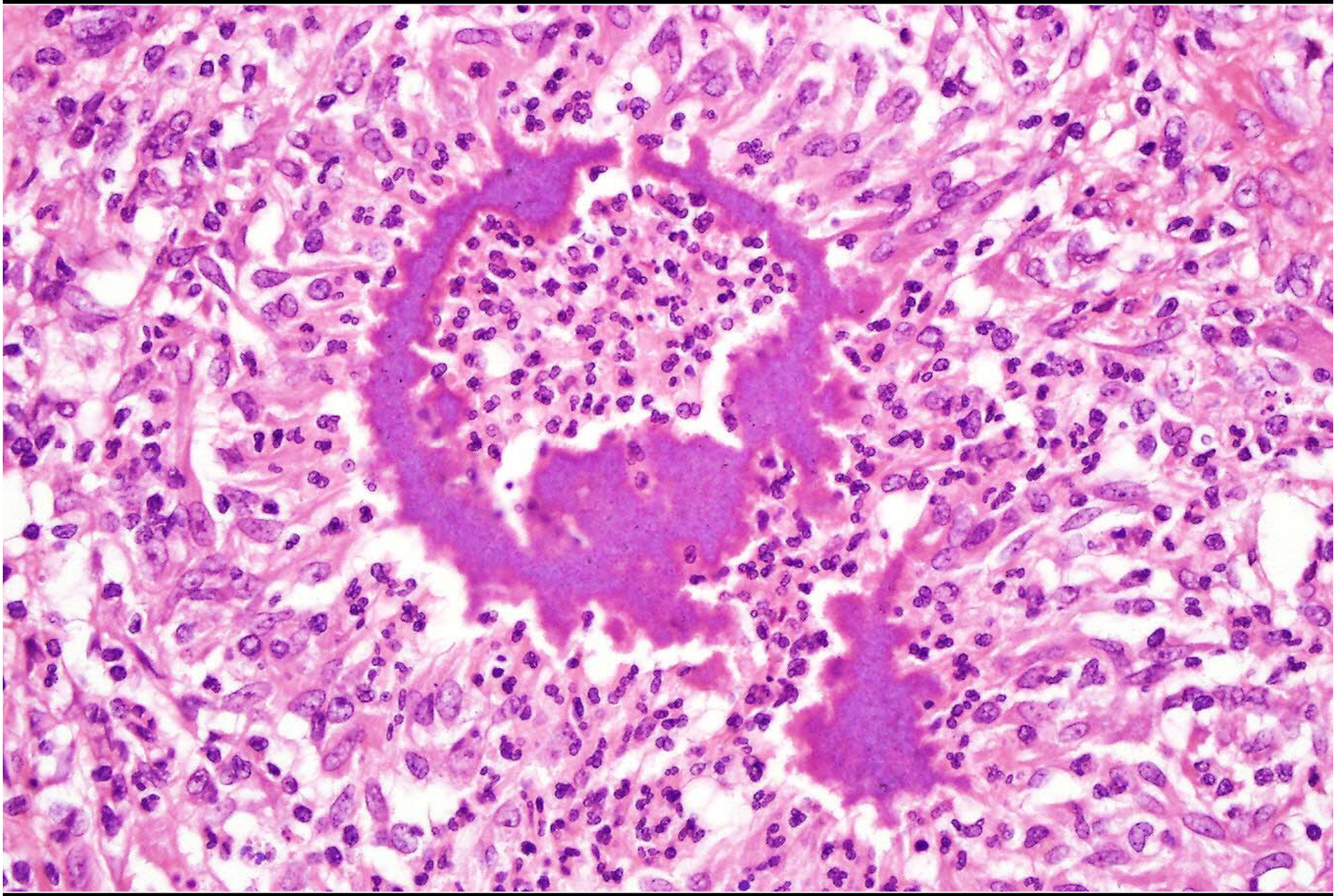
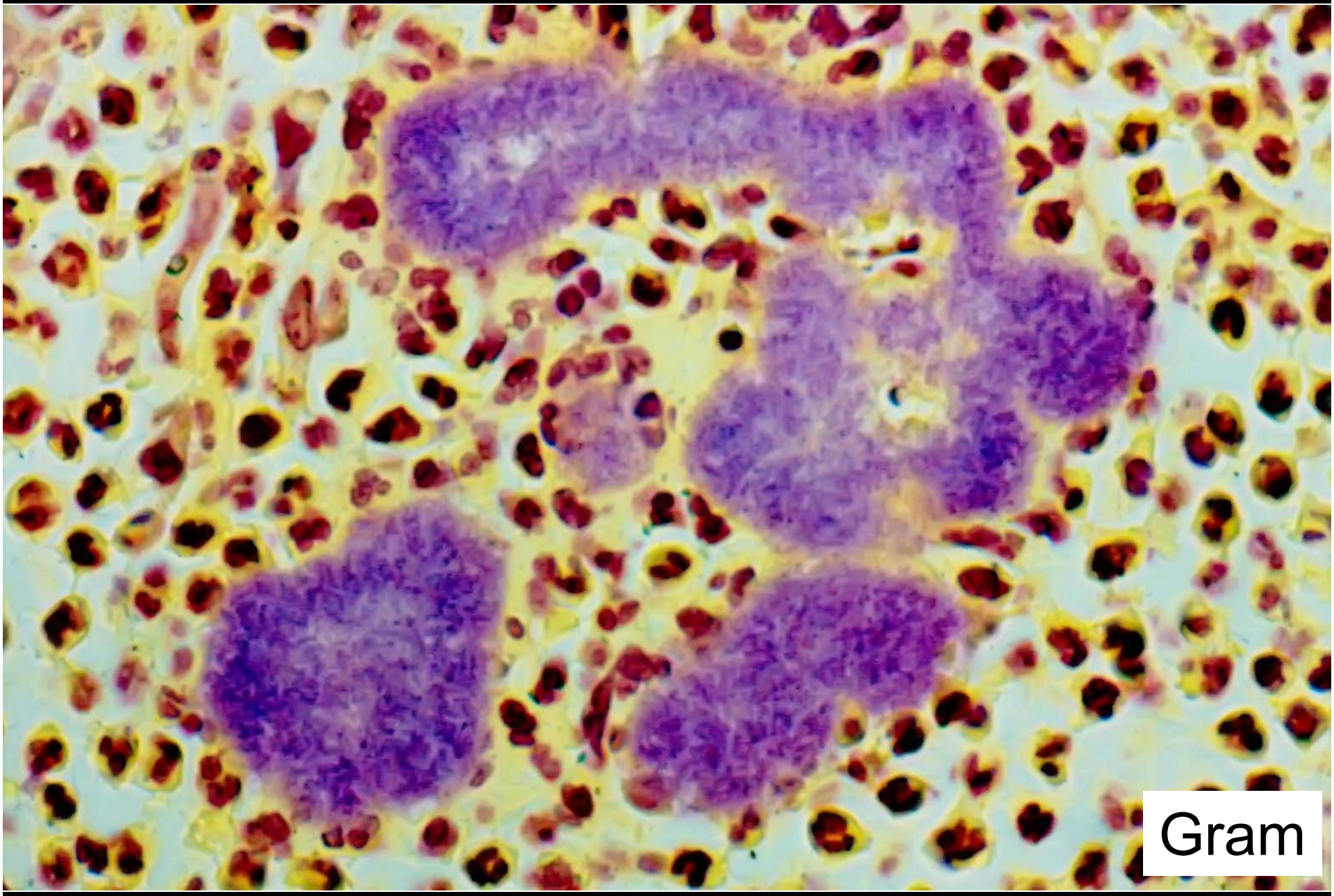


From: Grayson W. Chapter 18. In: Calonje E *et al* eds, McKee's *Pathology of the Skin With Clinical Correlations,* 5th ed, Elsevier Ltd, 2018 (in press)


Gram

Mycetoma

DIFFERENTIAL DIAGNOSIS

2. DERMATOPHYTIC PSEUDOMYCETOMA

- Very rare
- Lacks draining sinus tracts
- Implicated dermatophytes:
  - *Microsporum* spp.
  - *Trichophyton* spp.
- Strong propensity to involve scalp

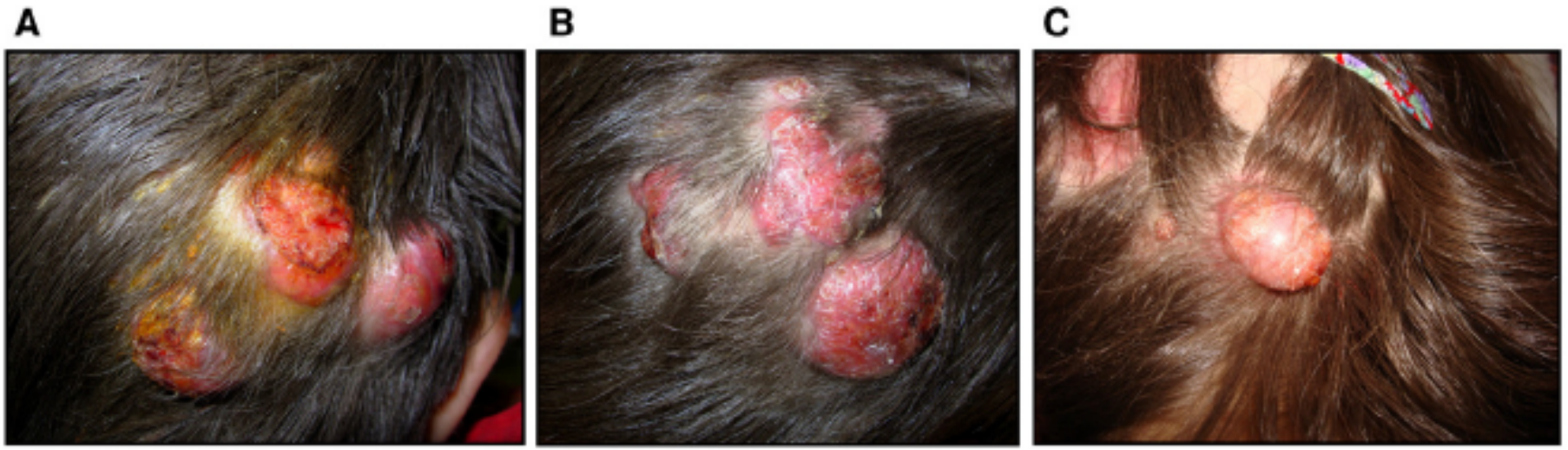


Fig. 1. Tumor-like lesions on the patient's scalp. (A) Initial presentation. (B) Clinical presentation after treatment with fluconazol–terbinafine. (C) Nodule emerging as a new lesion, 1 year after surgical extirpation of initial tumor-like nodules.

From: Chiapello LS *et al*. *Diagn Microbiol Infect Dis* 2011;70:145-149.

FIGURE 1. Exophytic, pink, boggy nodules on the occipital scalp, showing serosanguinous crust. No sinus tracts or grains are evident.

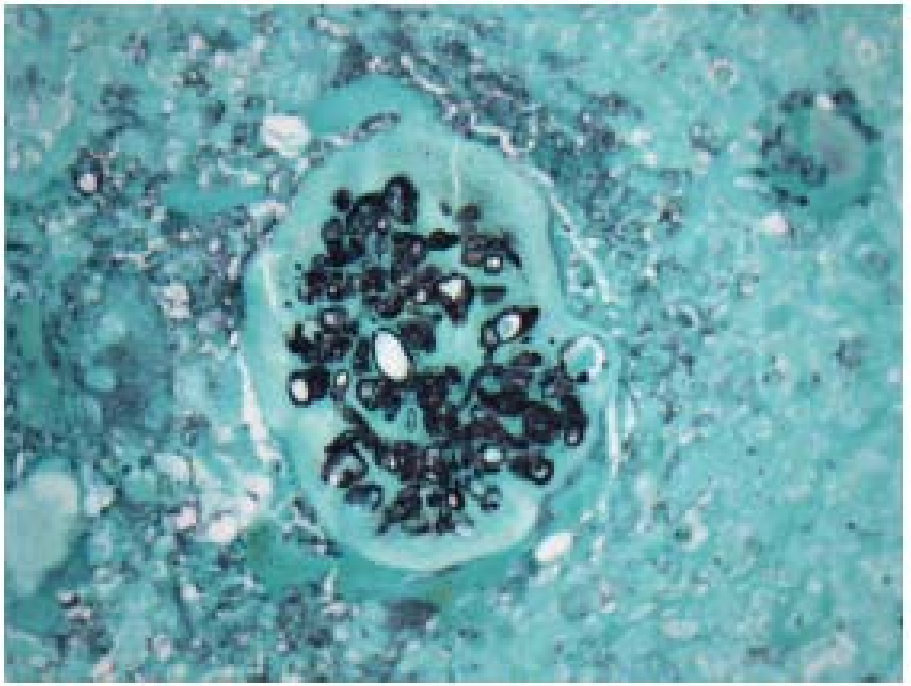


FIGURE 3. A GMS stain highlights clusters of hyphae (GMS, ×400).

From: Castro-Echeverry E *et al*. *Am J Dermatopathol* 2017;27:e23-e25.

TABLE 1. Dermatophytic Pseudomycetomas

Authors	Year Reported	Age, years	Gender	Area of Involvement	Organism	Geographic Area of Origin
West[6]	1980	25	Male	Scalp	*Microsporum audouinii*	Louisiana
Rinaldi[7]	1983	13	Female	Scalp	*Microsporum canis*	United States
Chen[8]	1993	25	Male	Scalp	*Microsporum ferrugineum*	Taiwan
Zaror L[9]	1997	8	Male	Trunk	*Microsporum canis*	Chile
Vezon G[10]	2000	22	Female	Scalp	*Microsporum canis*	France (Martinique)
Moraes[11]	2001	23	Female	Scalp	*Trichophyton tonsurans*	Brazil
Botterel[3]	2001	15	Female	Scalp	*Trichophyton schoenleinii*	Senegal
Colwell[12]	2004	19	Female	Scalp	*Microsporum canis*	Dominican Republic
Ali[13]	2005	52	Male	Breast	*Trichophyton rubrum*	Pakistan
Petrov[14]	2006	32	Female	Trunk, upper and lower extremities	*Trichophyton mentagrophytes*	Bulgaria
Kramer[15]	2006	9	Female	Scalp	*Microsporum canis*	Pennsylvania
Berg[16]	2007	65	Female	Knee	*Microsporum canis*	Minnesota
Chiapello[17]	2011	6	Female	Scalp	*Microsporum canis*	Argentina
Tirado-Gonzalez[18]	2012	77	Female	Head, neck and trunk	*Microsporum gypseum* and *Microsporum canis*	Venezuela
Tirado-Gonzalez[18]	2012	75	Female	Scalp	*Microsporum canis*	Israel
Present case	2016	18	Female	Scalp	*Trichophyton* sp.	Texas

From: Castro-Echeverry E *et al*. *Am J Dermatopathol* 2017;27:e23-e25.

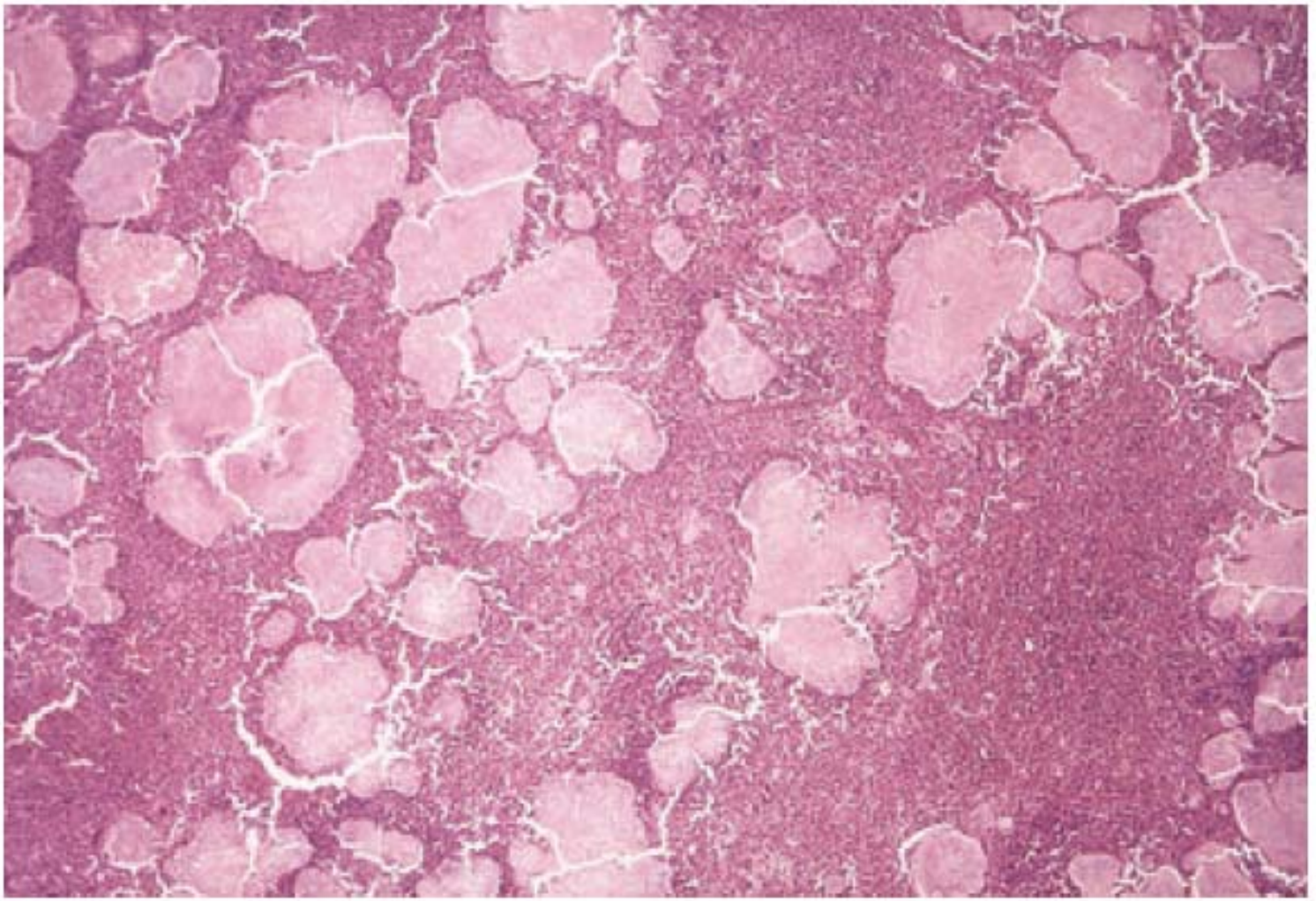


Figure 1. Granulomatous dermatitis with numerous large fungal grains. Hematoxylin and eosin, ×20 magnification.

From: Kramer SC *et al*. *Pediatric Dermatol* 2006;23:473-475.

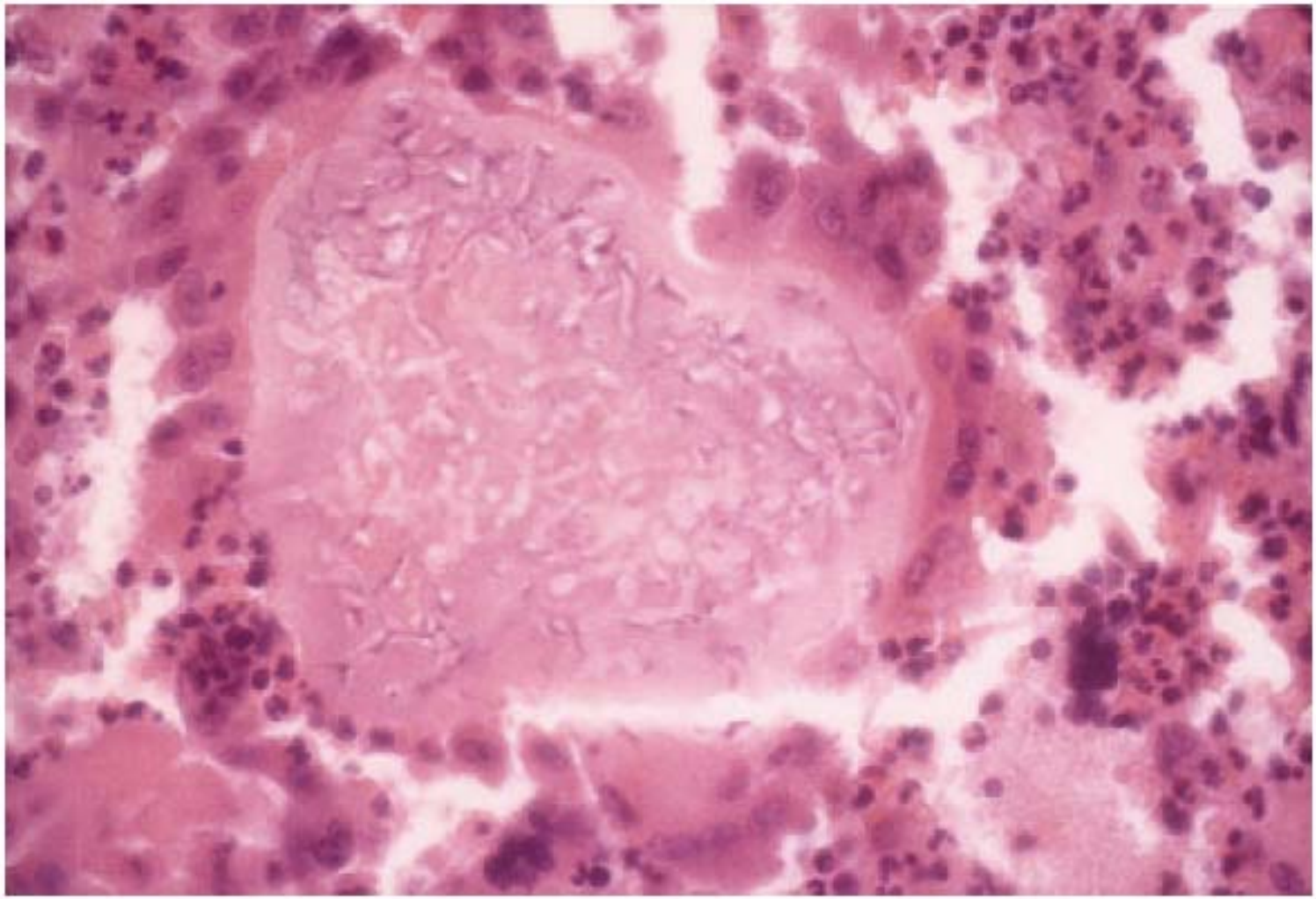


Figure 2. Higher magnification shows an individual grain with chlamydoconidia and septate hyphae. Hematoxylin and eosin, ×400 magnification.

From: Kramer SC *et al*. *Pediatric Dermatol* 2006;23:473-475.

Mycetoma

TAKE-HOME MESSAGE

- Systematic diagnostic approach is required, including the use of relevant histochemical stains:
  - PAS
  - Silver stain, e.g. Grocott
  - Gram
  - Ziehl-Neelsen

Mycetoma

TAKE-HOME MESSAGE

- More precise identification of the aetiological species requires ancillary microbiological investigations, i.e. culture & PCR

Mycetoma

TAKE-HOME MESSAGE

- More precise identification of the aetiological species requires ancillary microbiological investigations, i.e. culture & PCR – but be aware of the limitations of pan-fungal PCR on FFPE tissue samples

Mycetoma

TAKE-HOME MESSAGE

- Be aware of potential histological mimics, i.e. botryomycosis & dermatophytic pseudomycetoma

Acknowledgements

- **Prof. Phillip H. McKee**; Boussais, France; former Associate Professor & Director of Dermatopathology, Brigham & Women's Hospital & Harvard University, Boston, MA, U.S.A.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