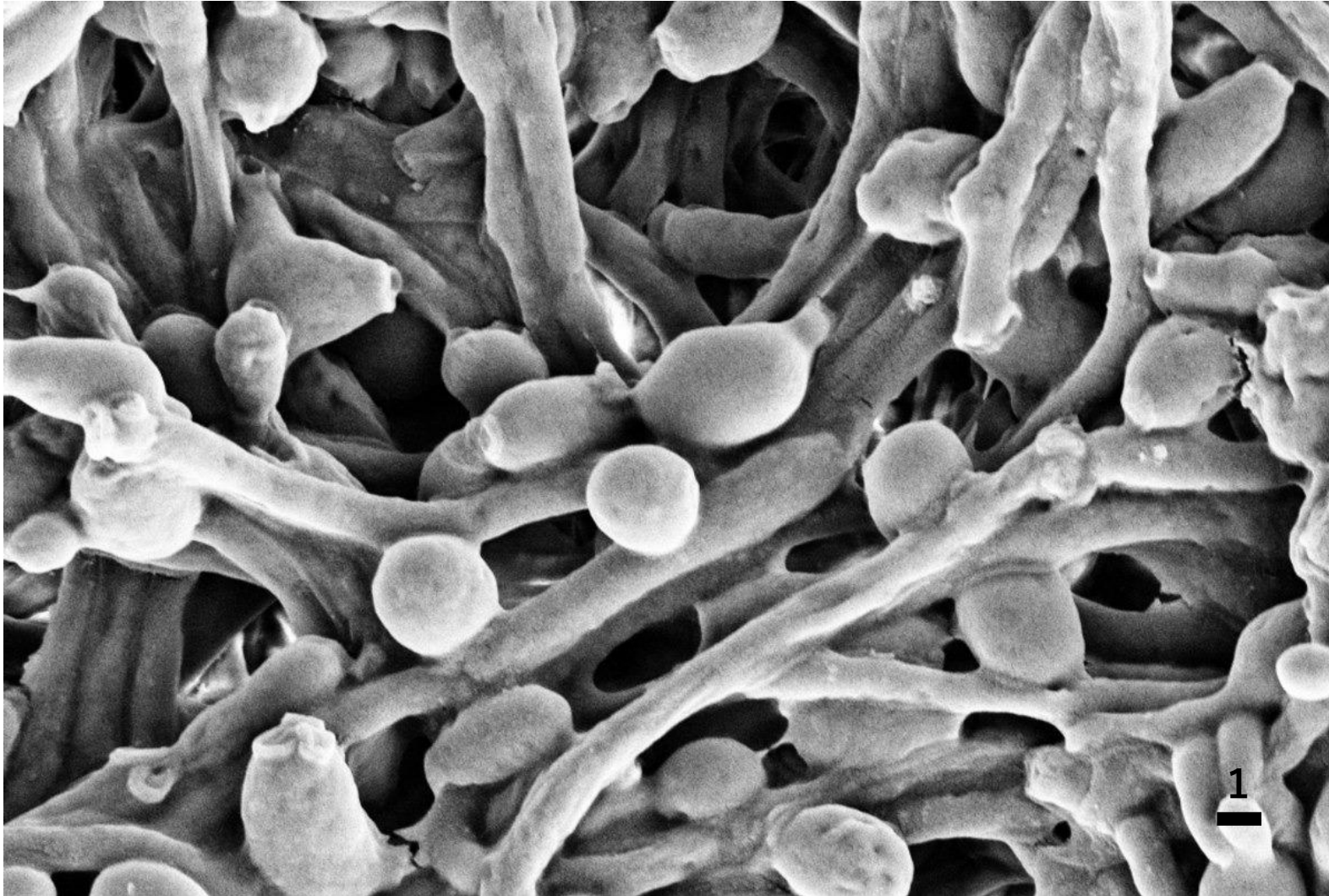
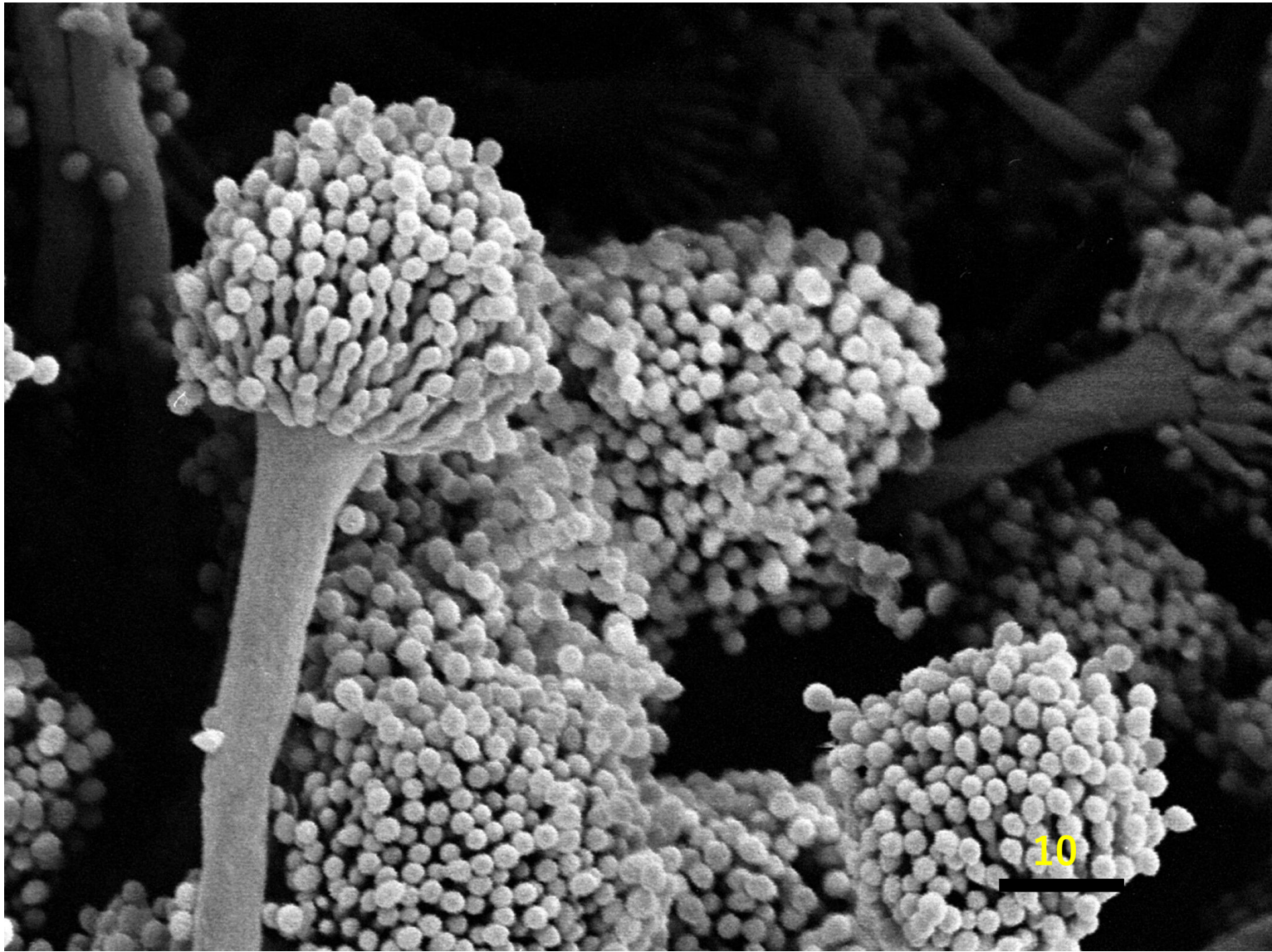


Ultrastructure of fungi

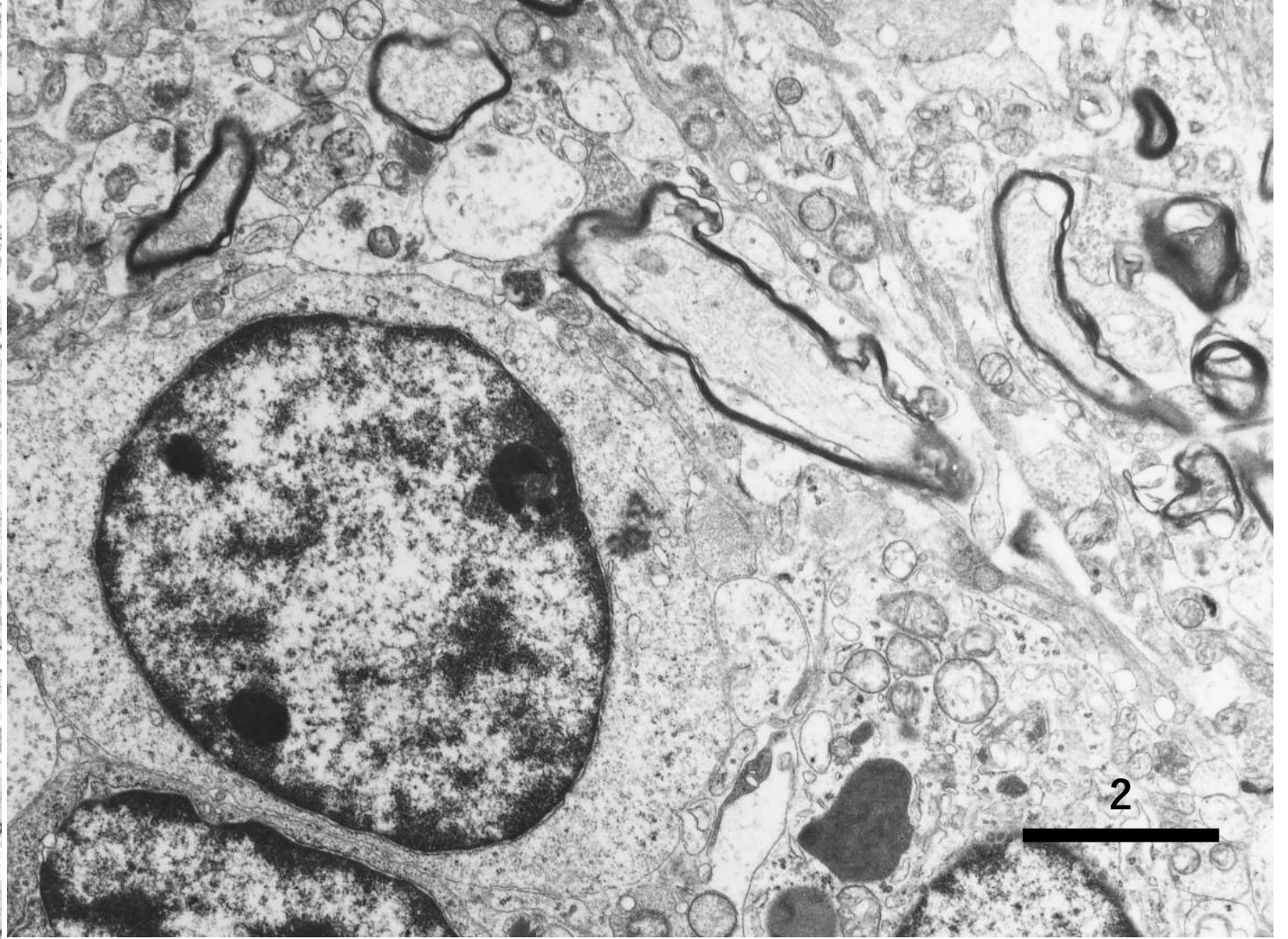
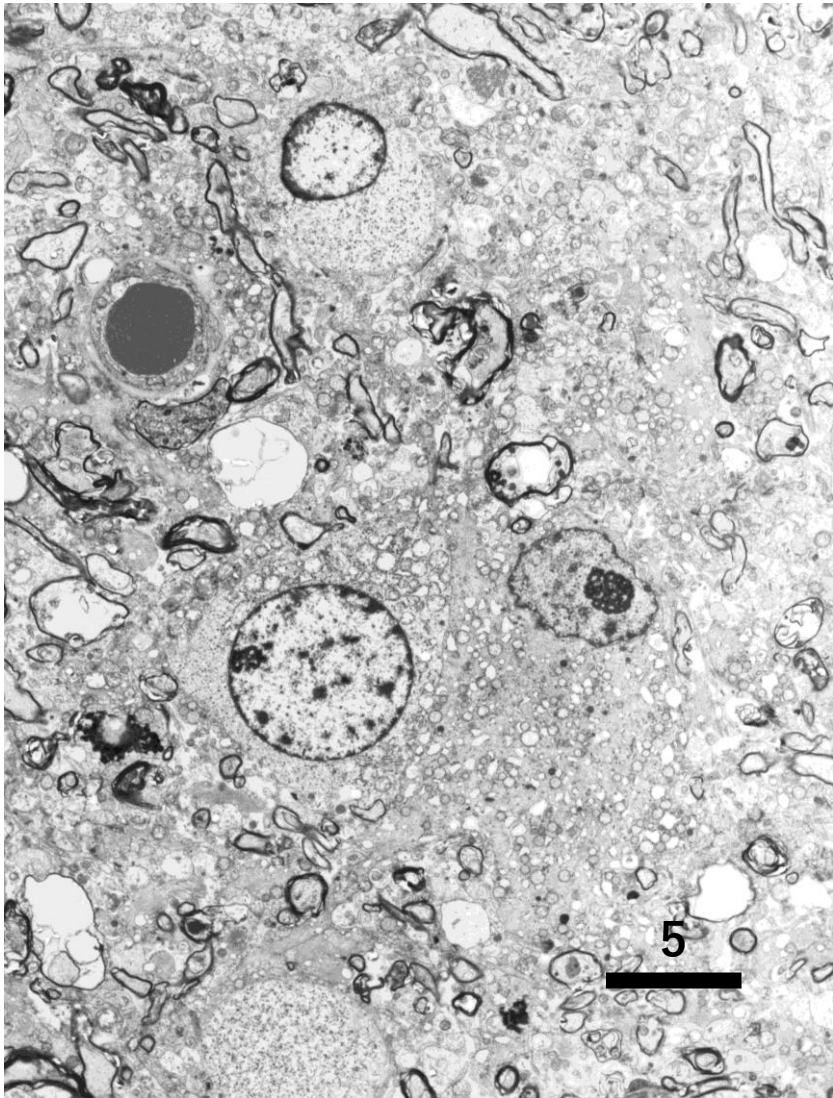
A variety of electron microscopic features of fungi and fungal infections are shown here. In addition to conventional transmission electron microscopy (TEM) and scanning electron microscopy (SEM), immunostaining and Grocott staining for pathogens at the ultrastructural level are presented. Please enjoy the variety.



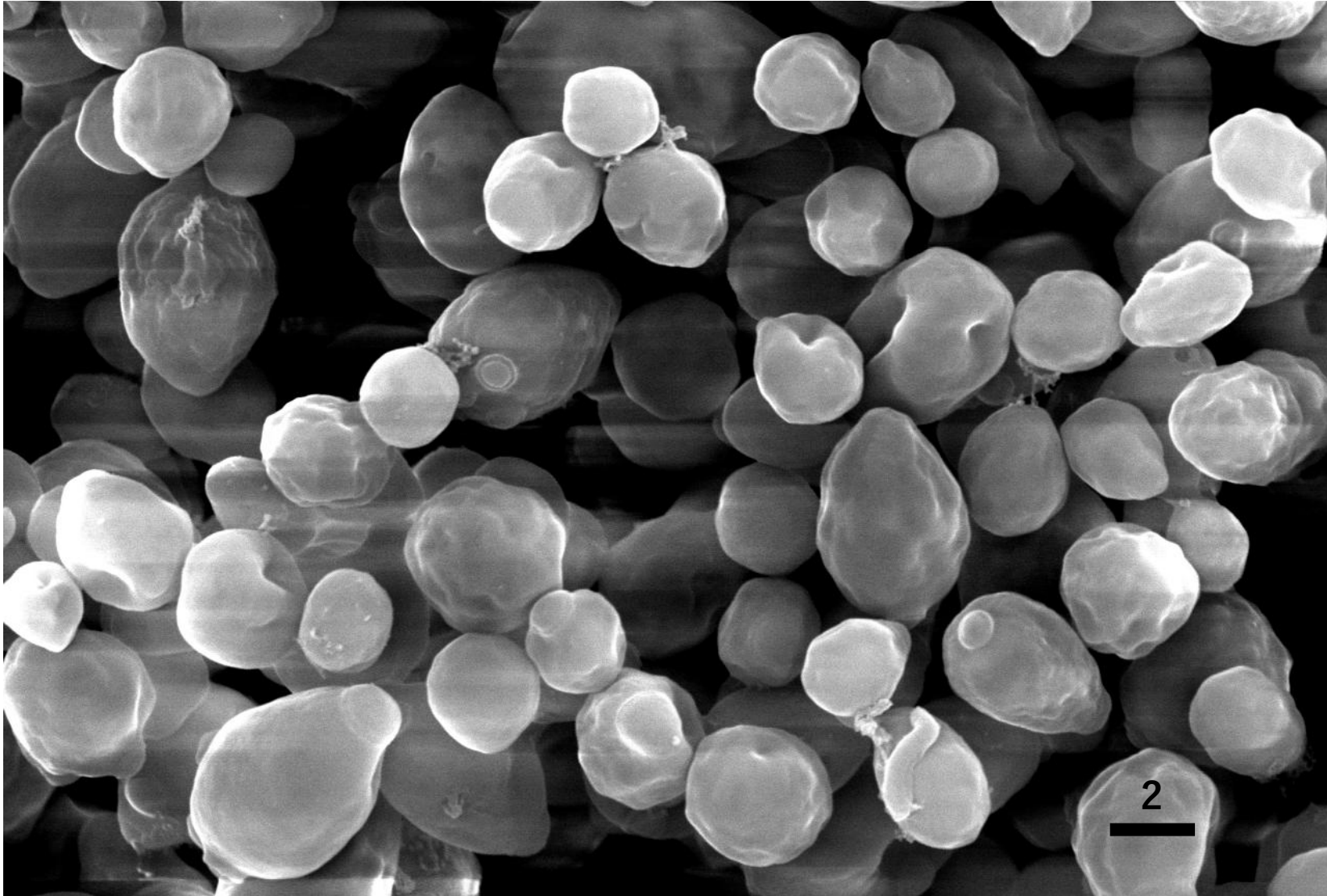
Candida albicans (SEM). Tube-shaped blastoconidial cells (pseudohyphae) and budding yeast cells are observed (borrowed from the Internet site, Wikipedia).



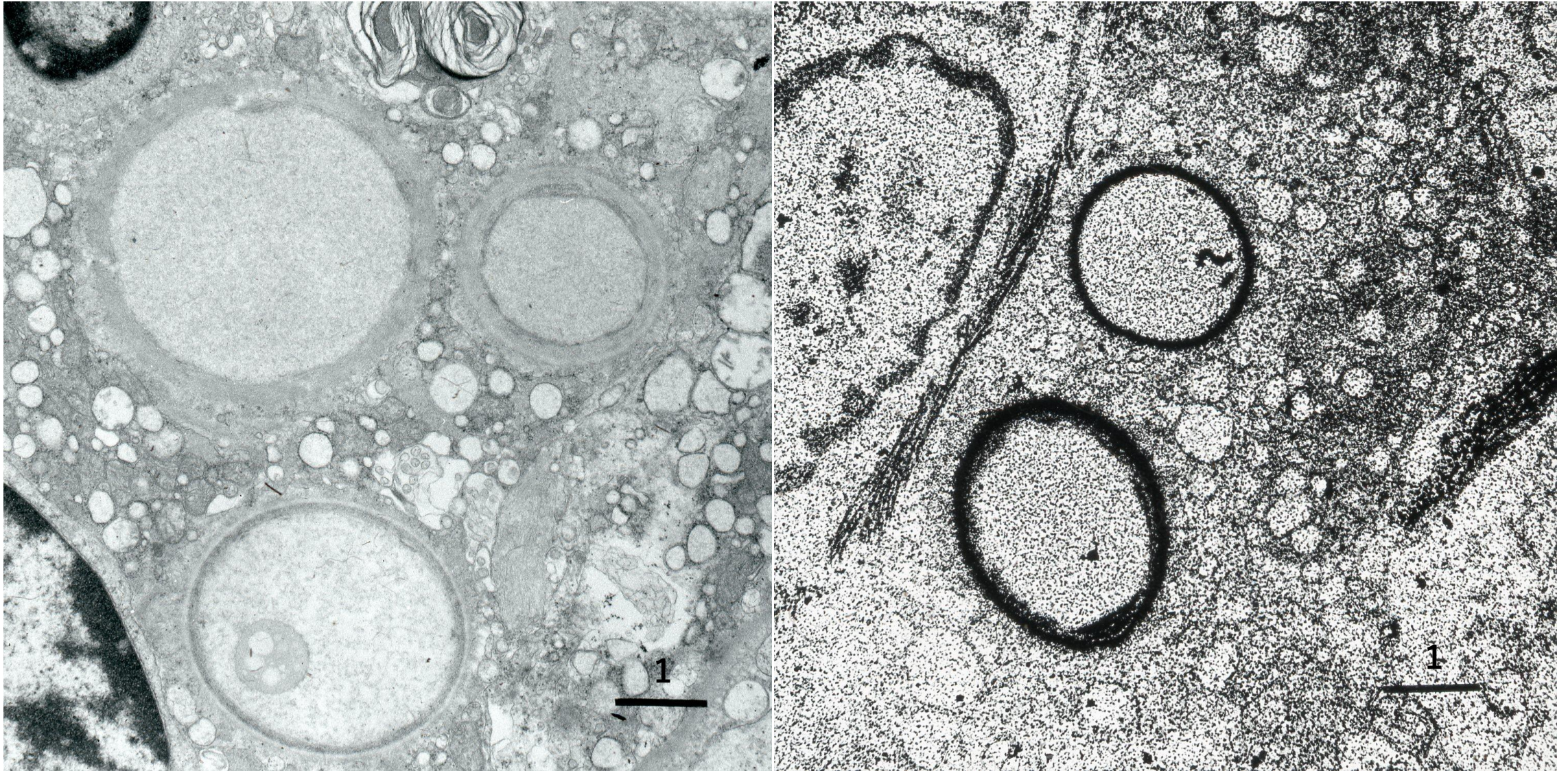
Aspergillus fumigatus (SEM). On the culture plate, *A. fumigatus* actively form conidiospores (conidial heads). Numbers of spores (conidia) are released. In the human body, the conidiospores are seen at the site exposed onto the air, such as bronchiectasia or external meatus (borrowed from the Internet site, Wikipedia).



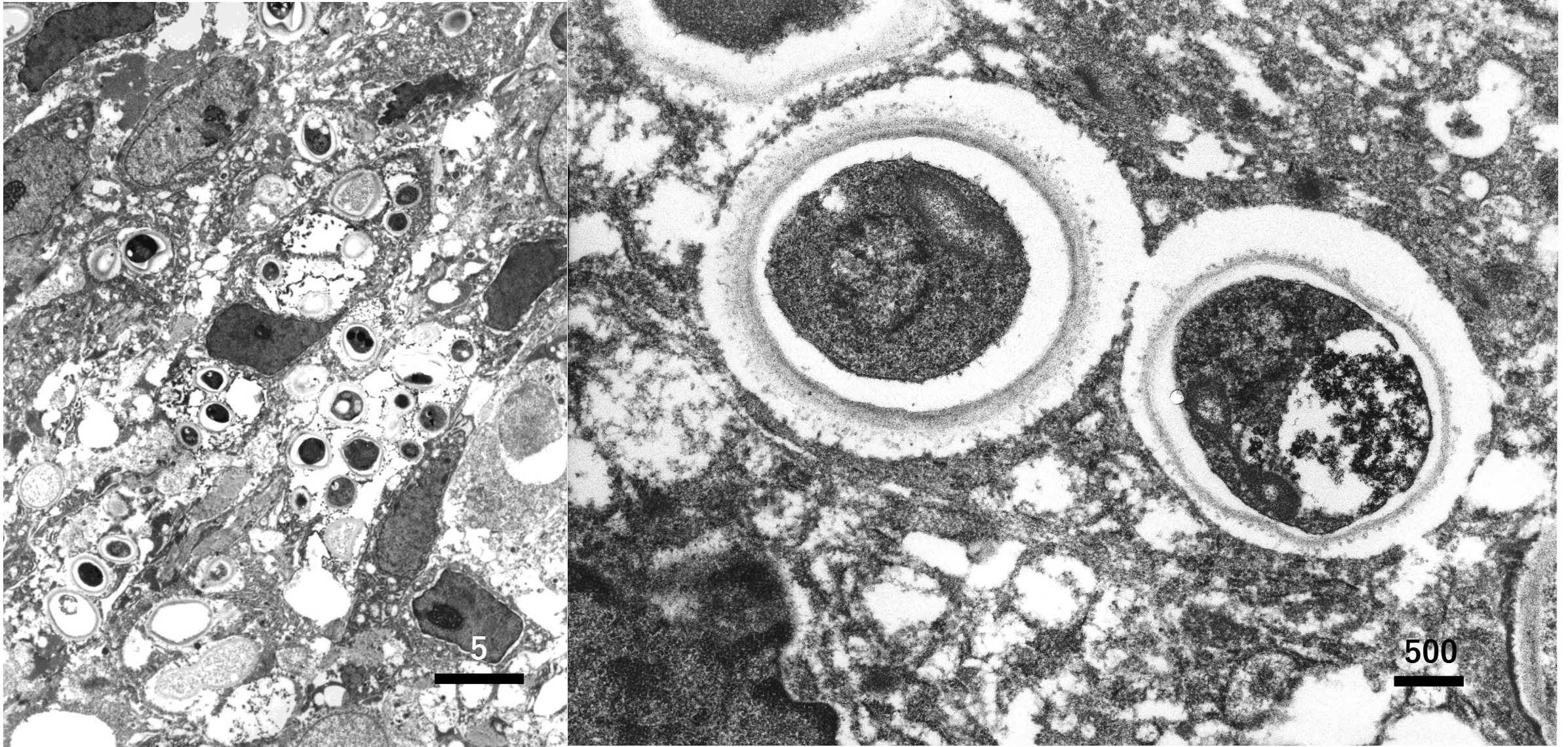
Mucormycosis of the brain seen in a 51 y-o male patient (TEM). Brain biopsy reveals invasive growth of hypha-forming fungi (mycelia), provoking active inflammatory infiltration in the brain poarenchyma.



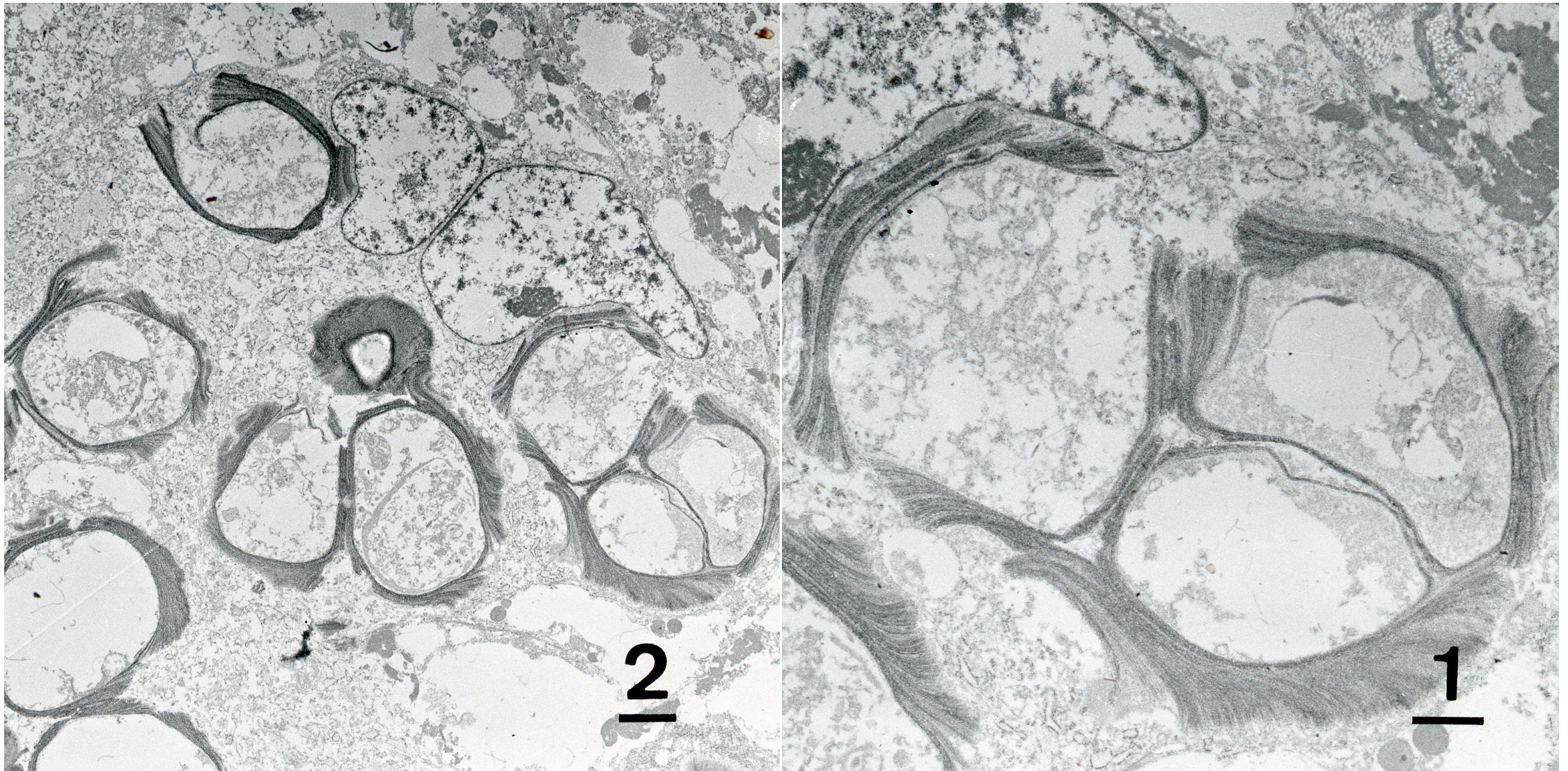
Wine yeasts, *Saccharomyces cerevisiae* (SEM). Wine yeasts play an important role in flavor development and in deepening color . Some strains metabolize acids, changing the pH of the wine.



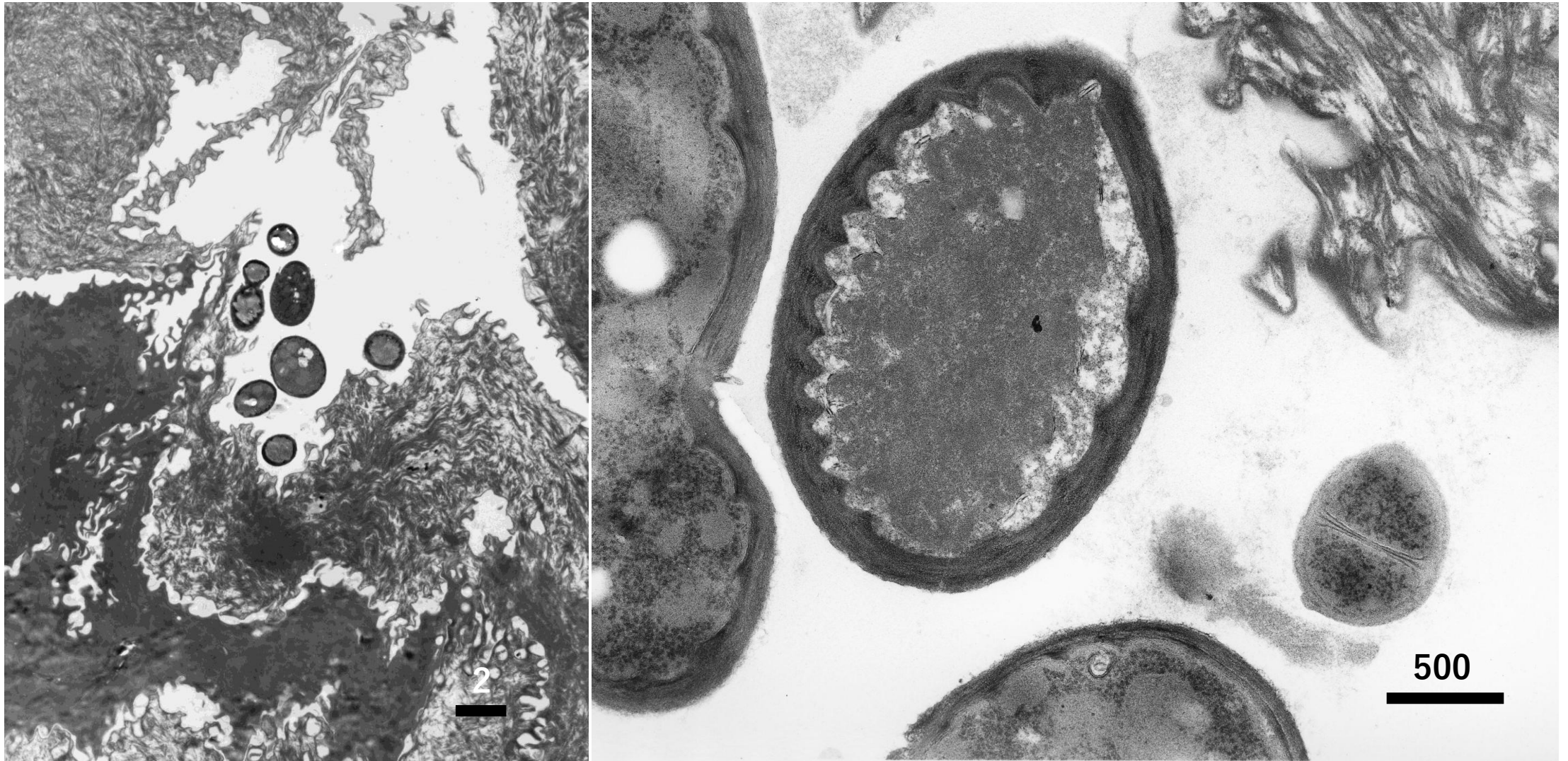
Cryptococcal granuloma of the lung (left: TEM, right: Grocott stain at the EM level). The nucleated yeast-form pathogen, *Cryptococcus neoformans*, grow in the cytoplasm of epithelioid macrophage (left). The capsule is methenamine silver impregnated (right).



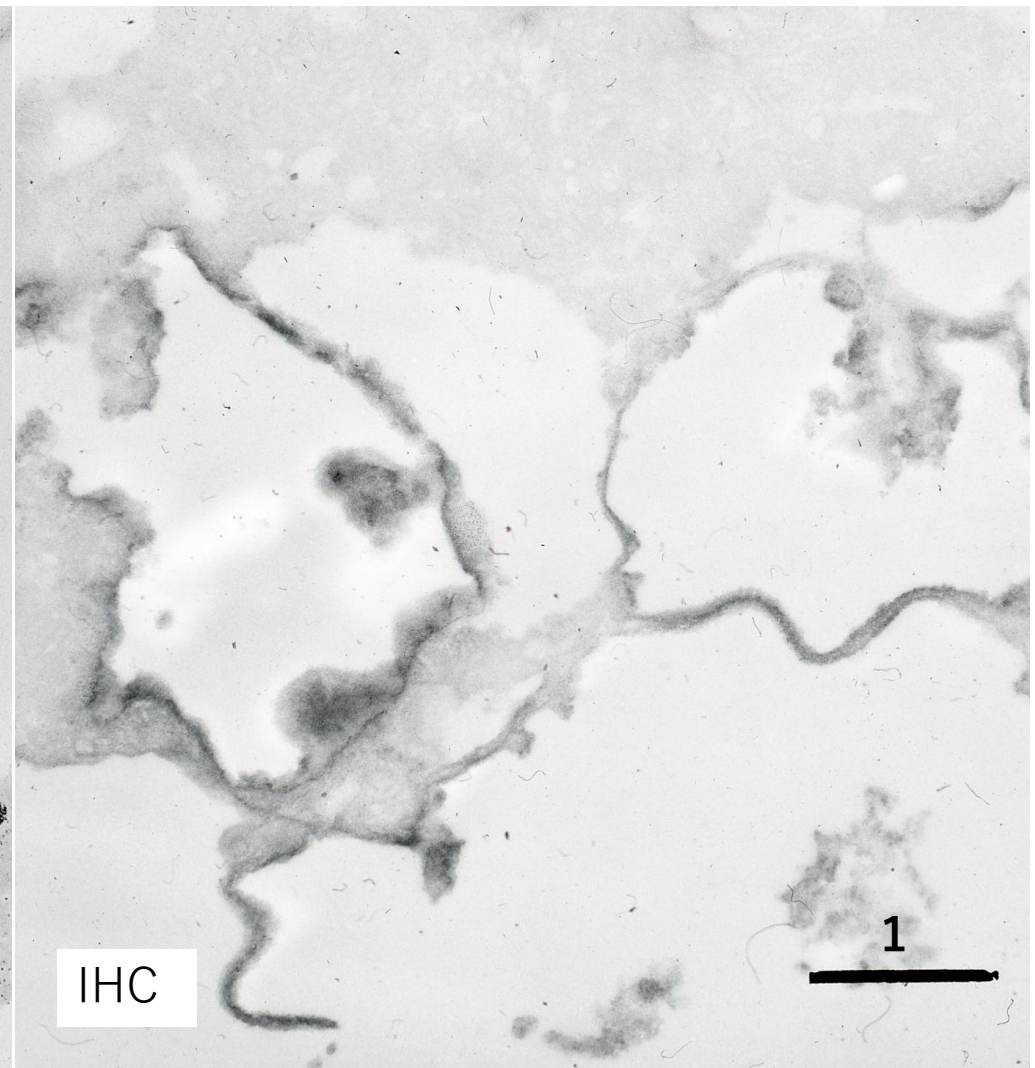
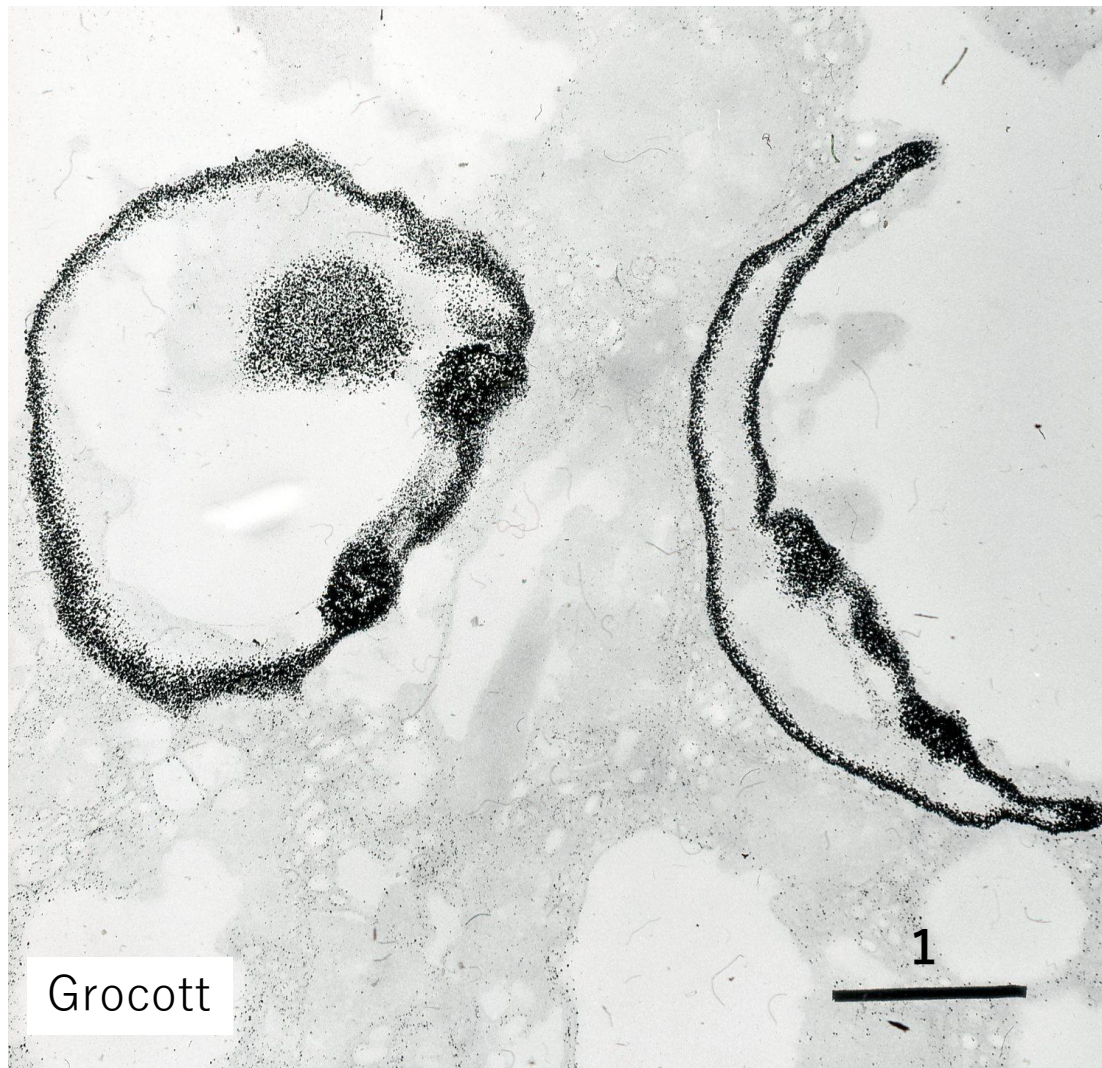
Histoplasma capsulatum infection of the colon seen in a 25 y-o Indonesian lady (TEM). Small-sized (2-4 μm in diameter) and thick-walled yeast-form fungi grow in the cytoplasm of macrophages infiltrating in the lamina propria mucosae. The nucleus can be recognized. Histoplasmosis is not endemic in Japan.



Chromomycosis (*Fonsecaea pedrosoi* infection) of the skin in a hemodialysis patient (TEM). Numbers of thick-walled and melanized yeasts “sclerotic cells” (or muriform bodies) are seen in the dermis. Chromomycosis is caused by infection of so-called dermatiaceous fungi (black fungi).



Malassezia furfur colonization on epidermal nevus (TEM). The lesion is seen on the lower leg of a 4 y-o boy. *M. furfur*, pathogenic for tinea versicolor, often shows secondary colonization on the skin lesion located in the seborrheic area. Thick-walled yeast-type fungi are seen on the cornified layer.



Pneumocystis jiroveci pneumonia. *P. jiroveci* (formerly called as *P. carinii*), now categorized in the fungus, causes lethal interstitial pneumonia in immunocompromised patients. Formalin-fixed, paraffin-embedded sections of the autopsy specimen were stained with Grocott (left) or immunostained with a monoclonal antibody (right), and then the pre-embedding method was applied to visualize the pathogens. The cyst wall of *P. jiroveci* are reactive with both techniques. “Parenthesis-like structures” are seen in the cysts.