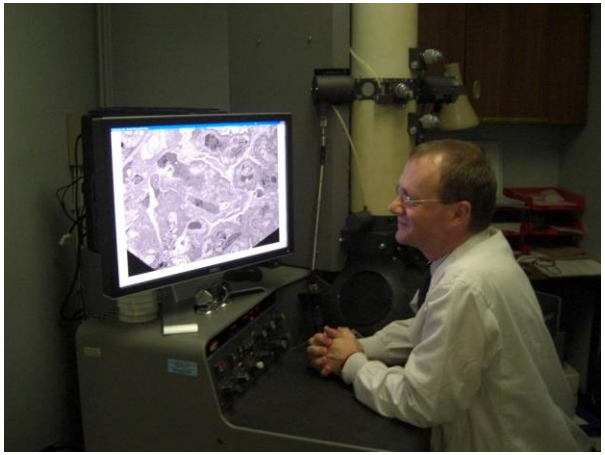
Basic Renal EM workshop

Southampton

September 30th 2011

Inflammatory cells and a few bacteria



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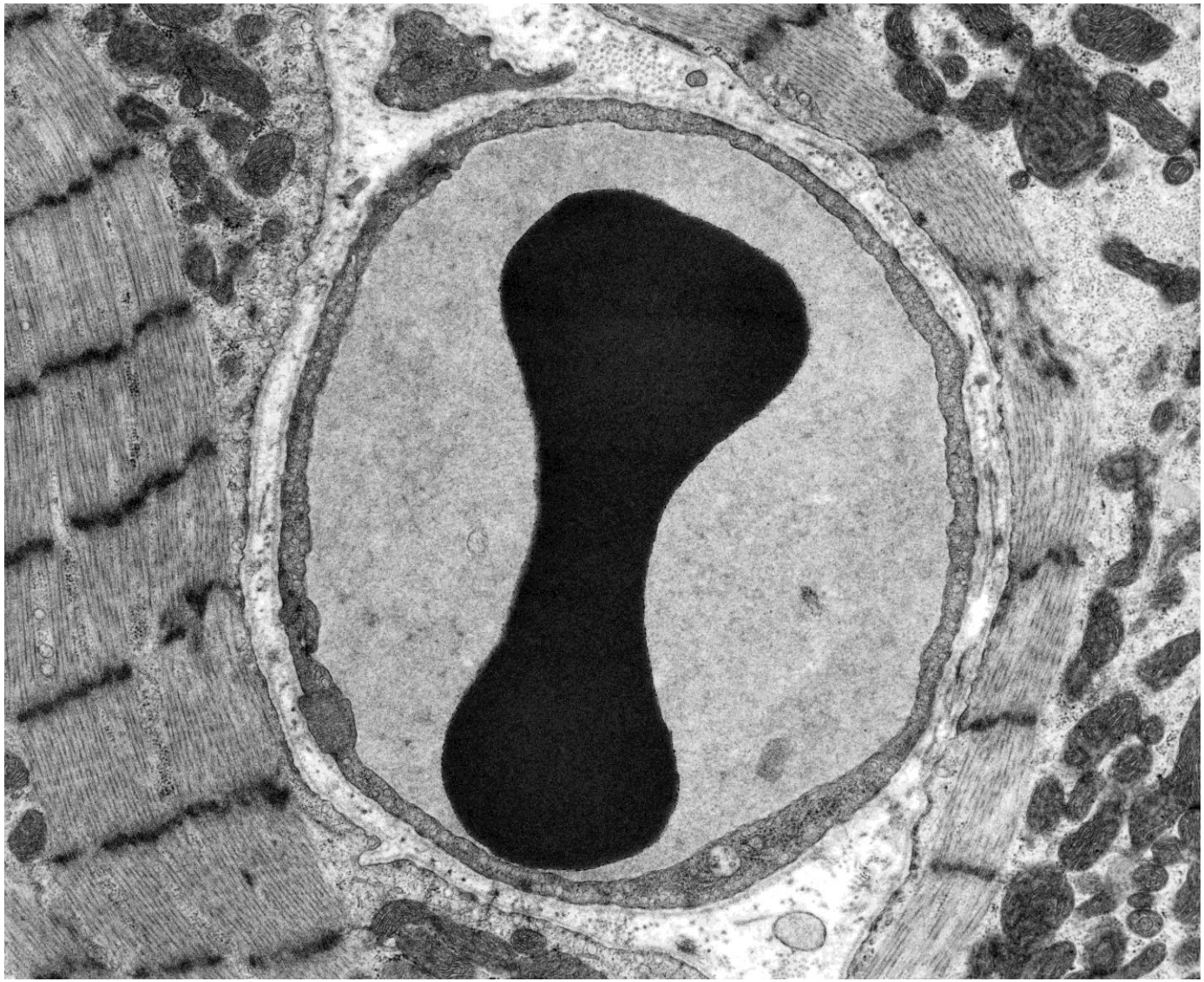
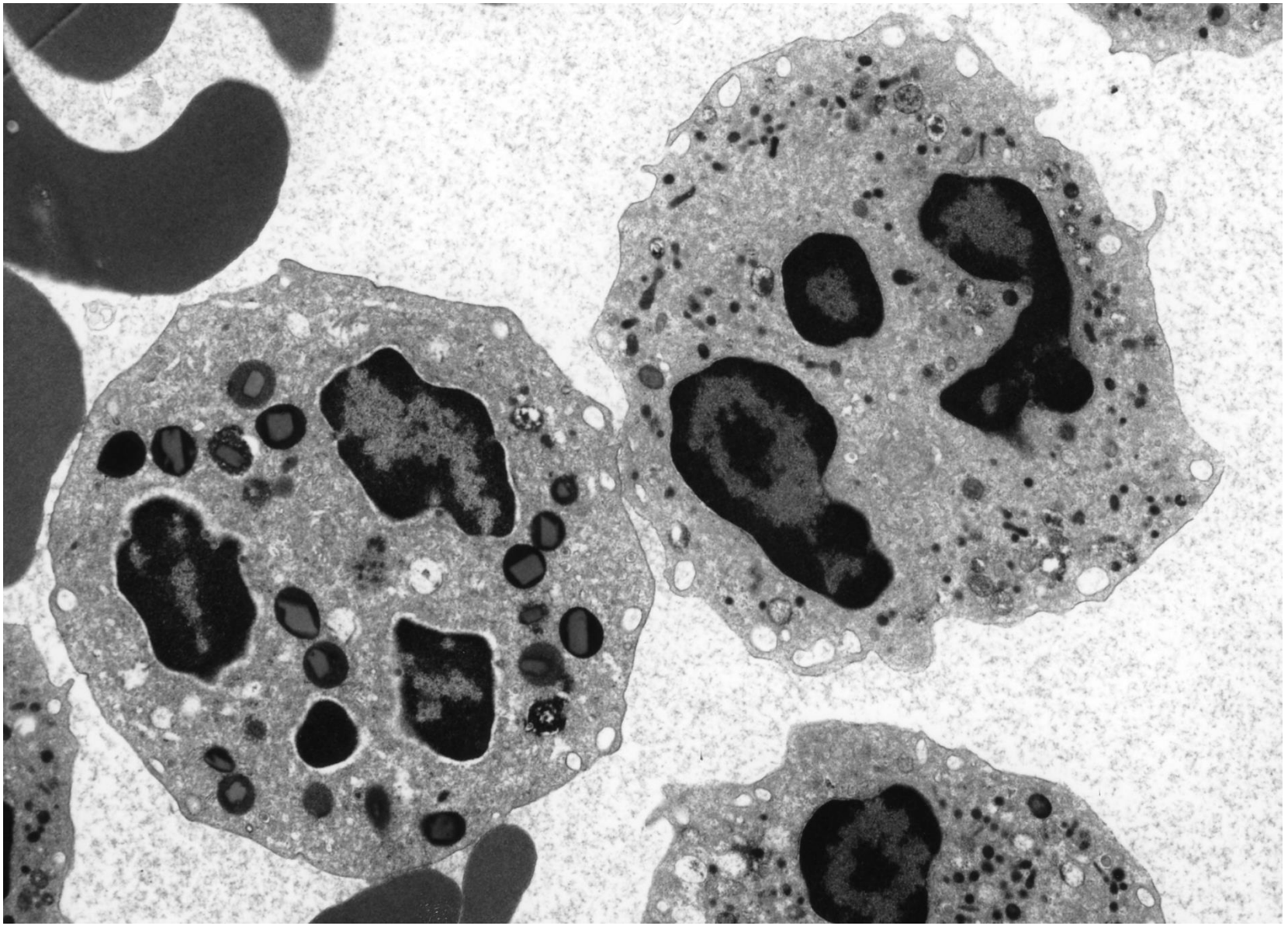
Circulating erythrocyte – in heart biopsy



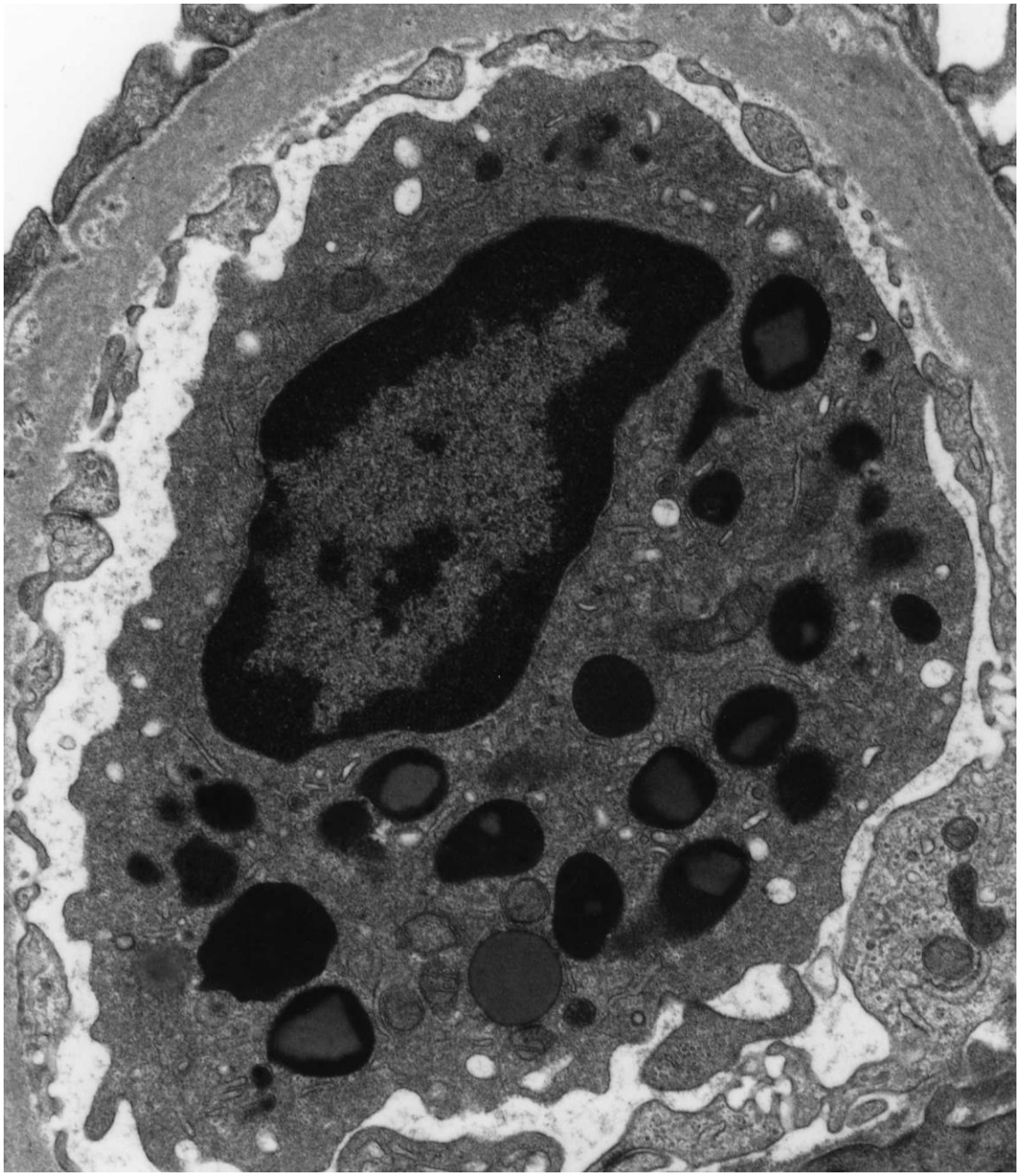
Eosinophil and neutrophil in centrifuged blood – buffy coat



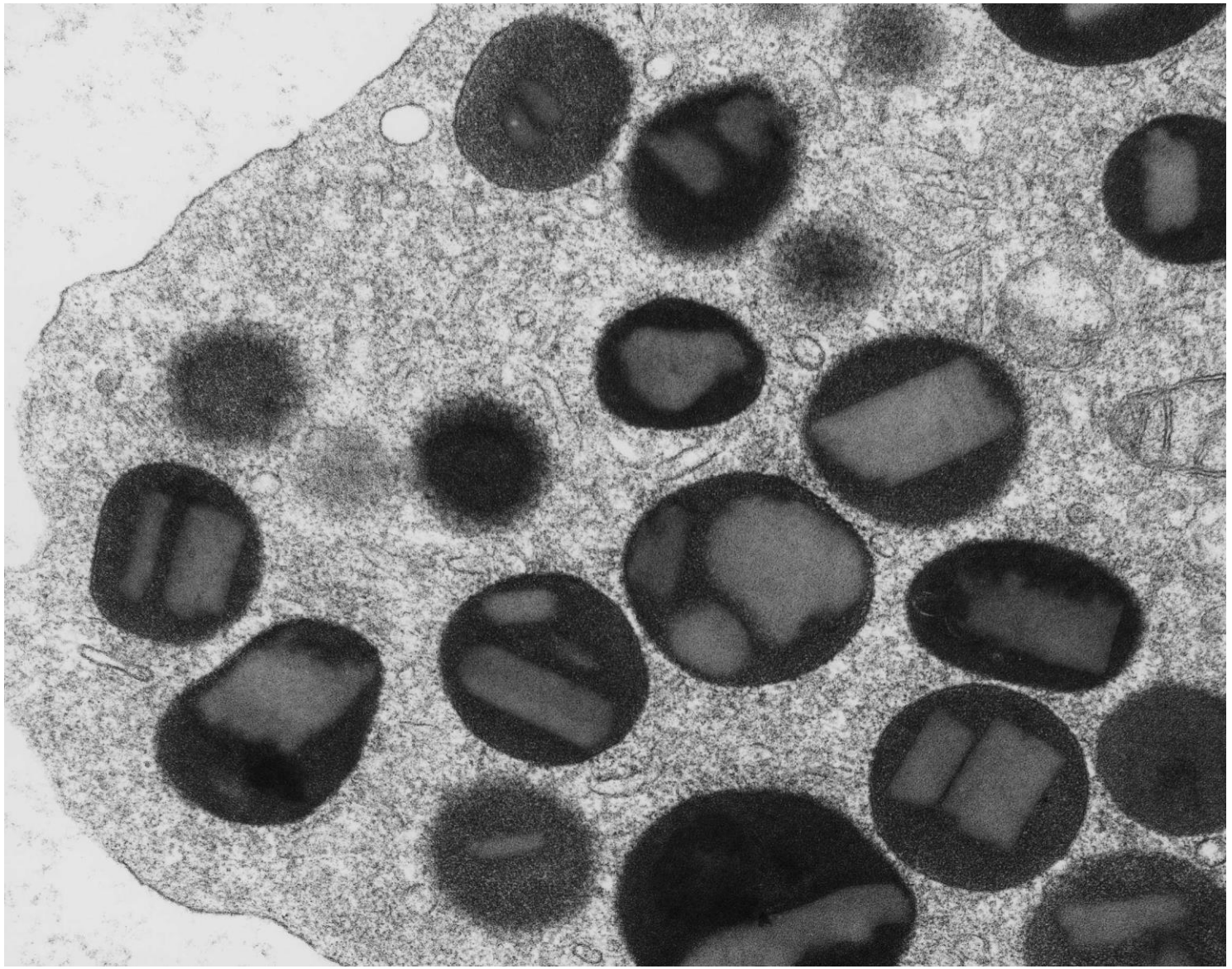
Eosinophil

Neutrophil

Circulating eosinophil in glomerular capillary loop

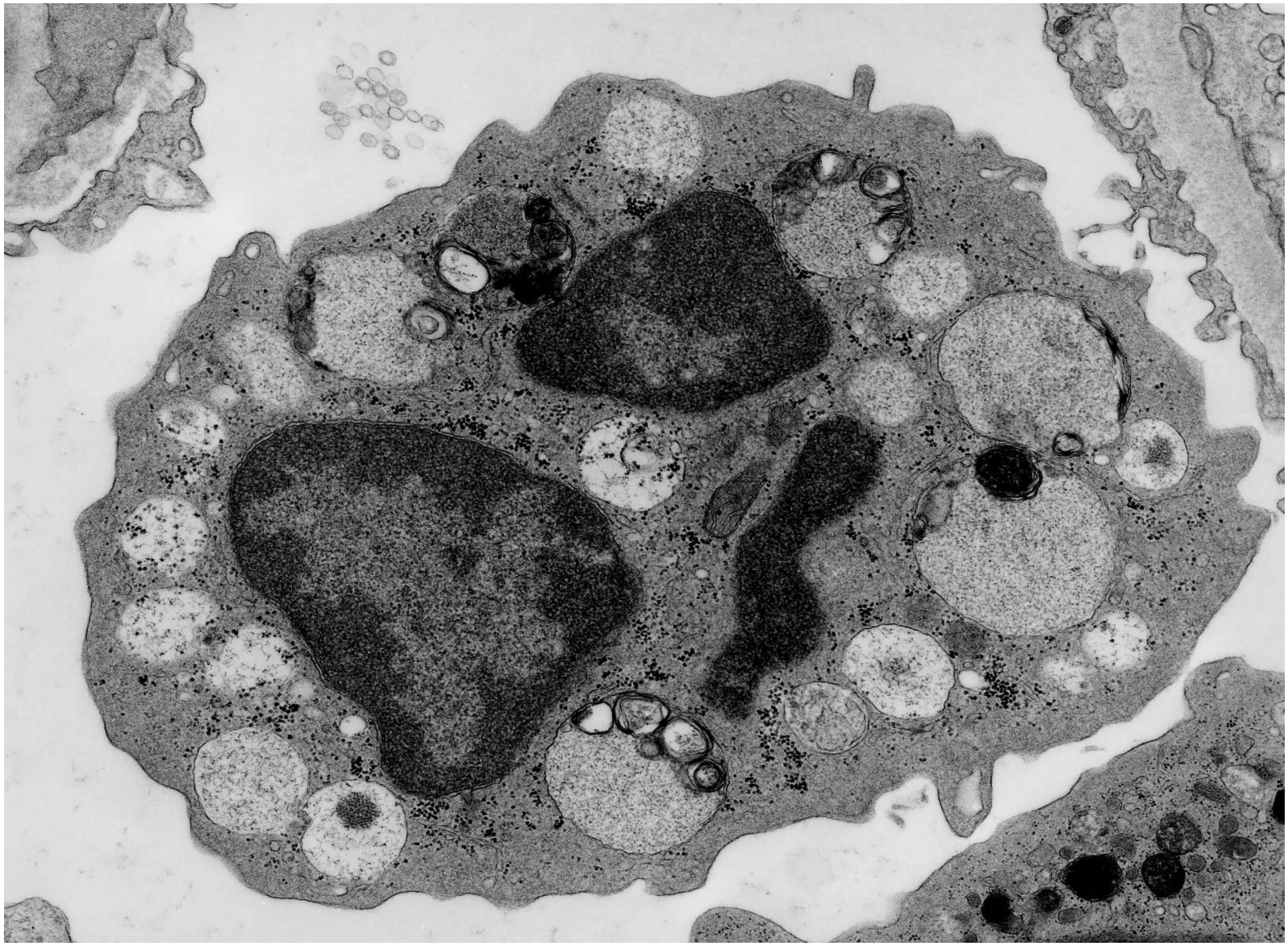


Eosinophil granules



Major basic protein in crystaloid

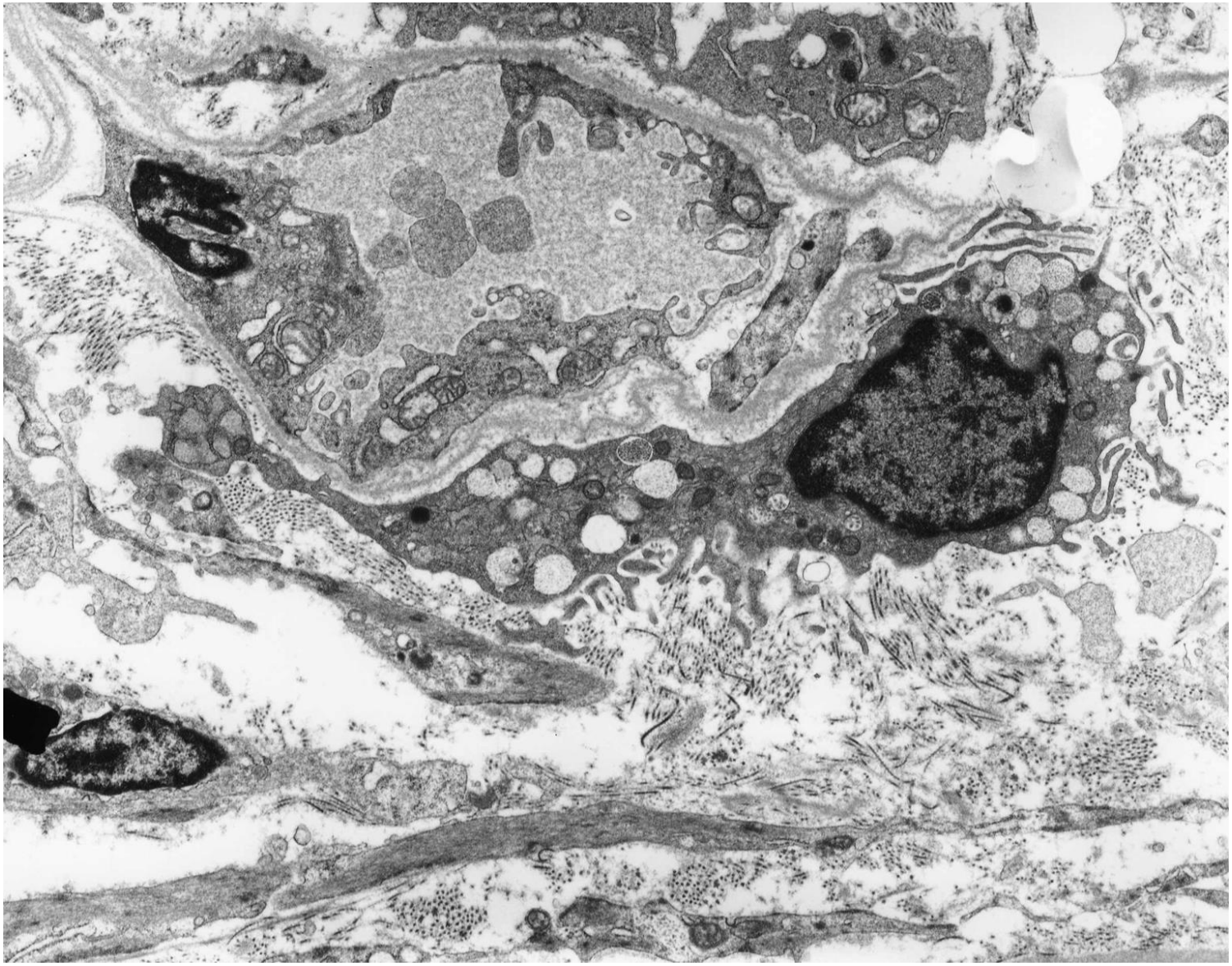
Circulating basophil in glomerular capillary loop



Circulating mast cell in renal peri-tubular capillary

Note smaller granules than basophil and nucleus not poly-lobated

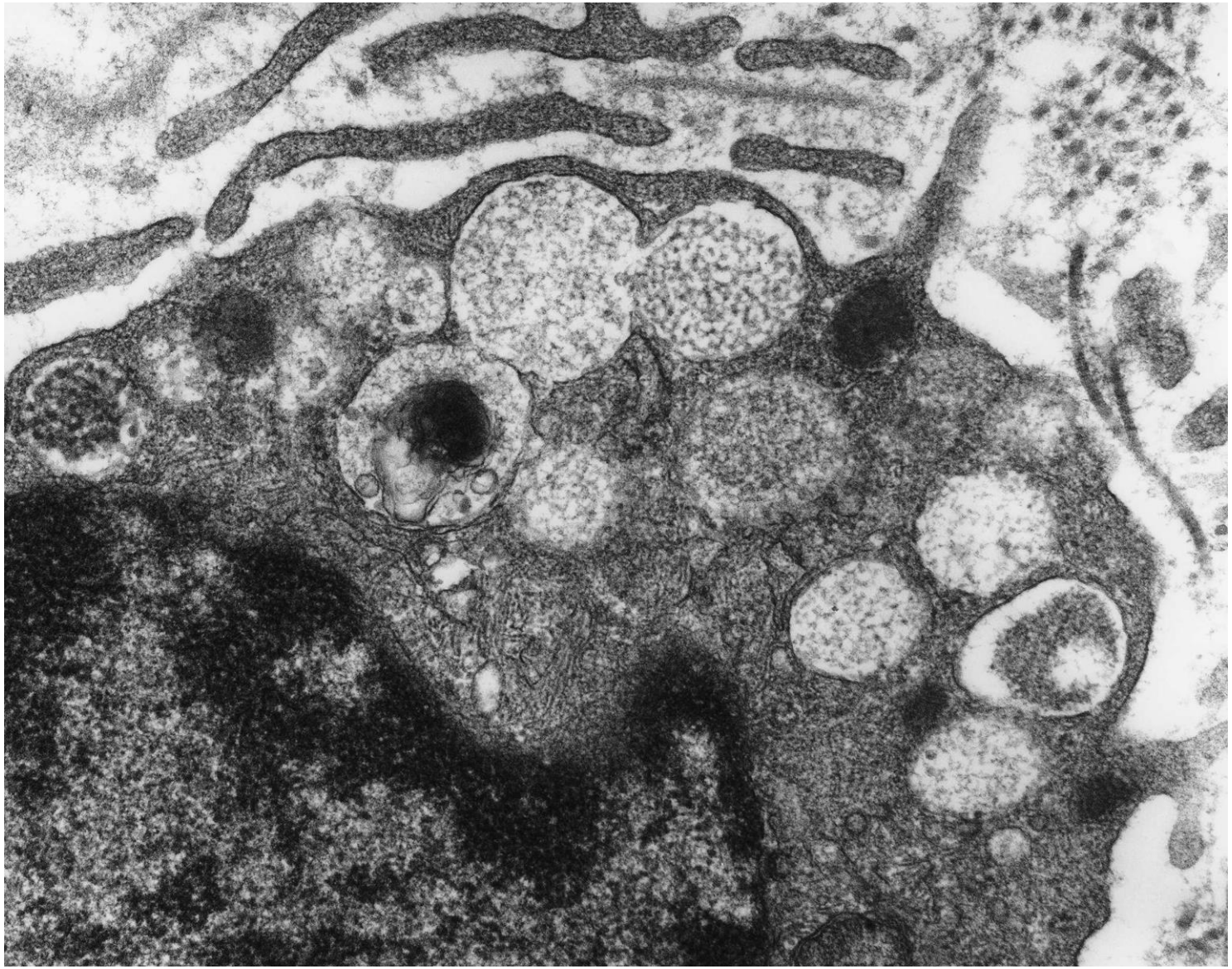
Mast cell in renal interstitium



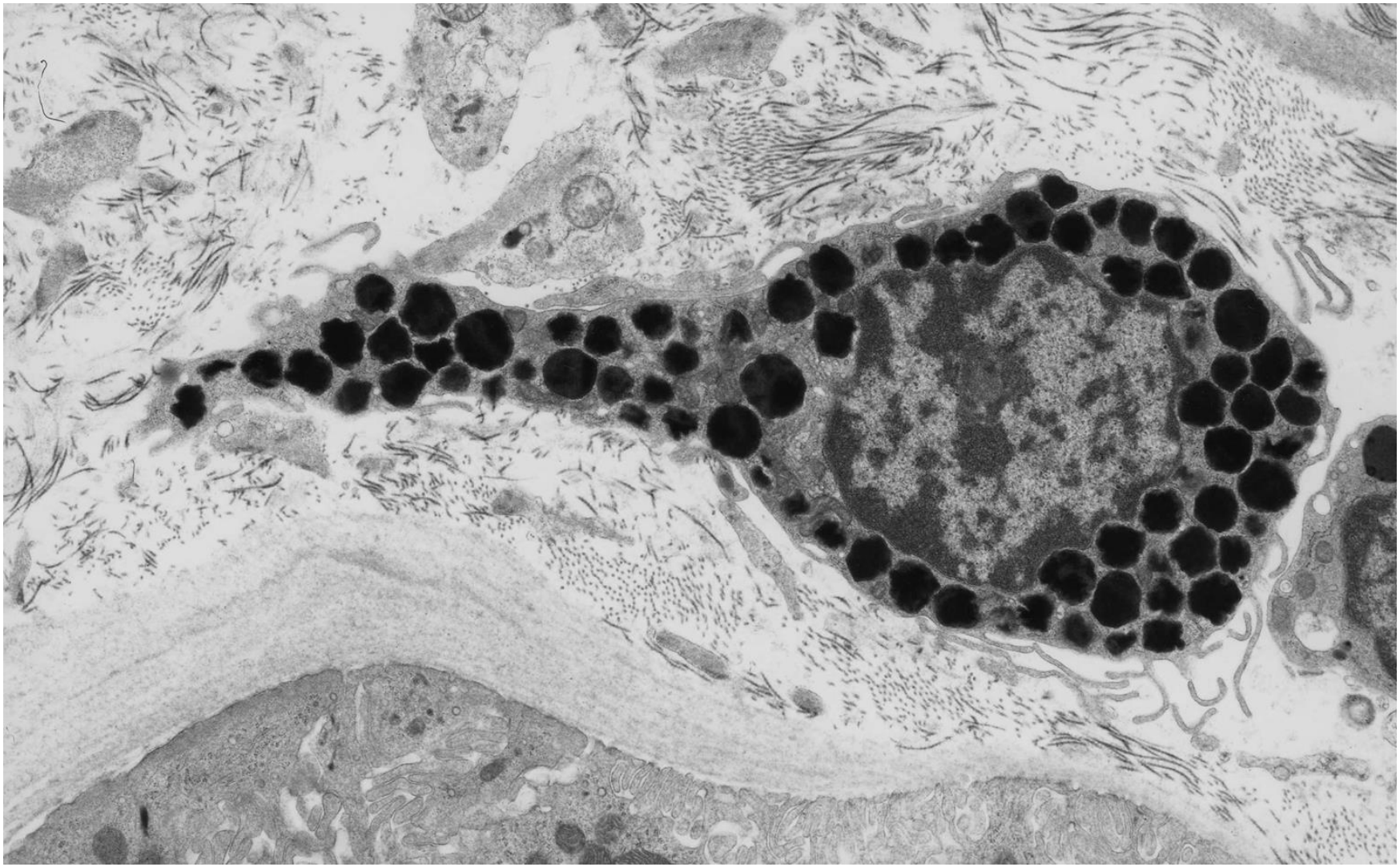
Mast cell granules are heterogeneous and differ in different sites

Higher magnification of previous slide

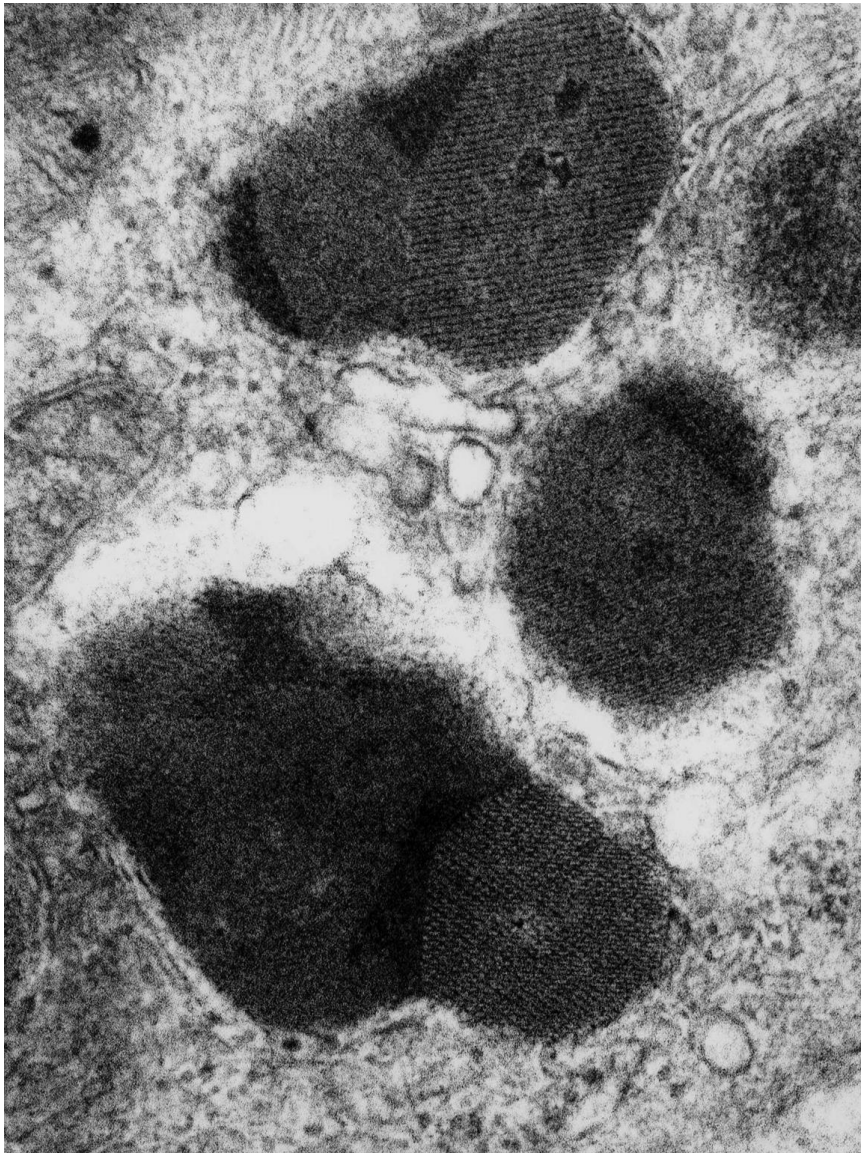
Mast cell in renal interstitium



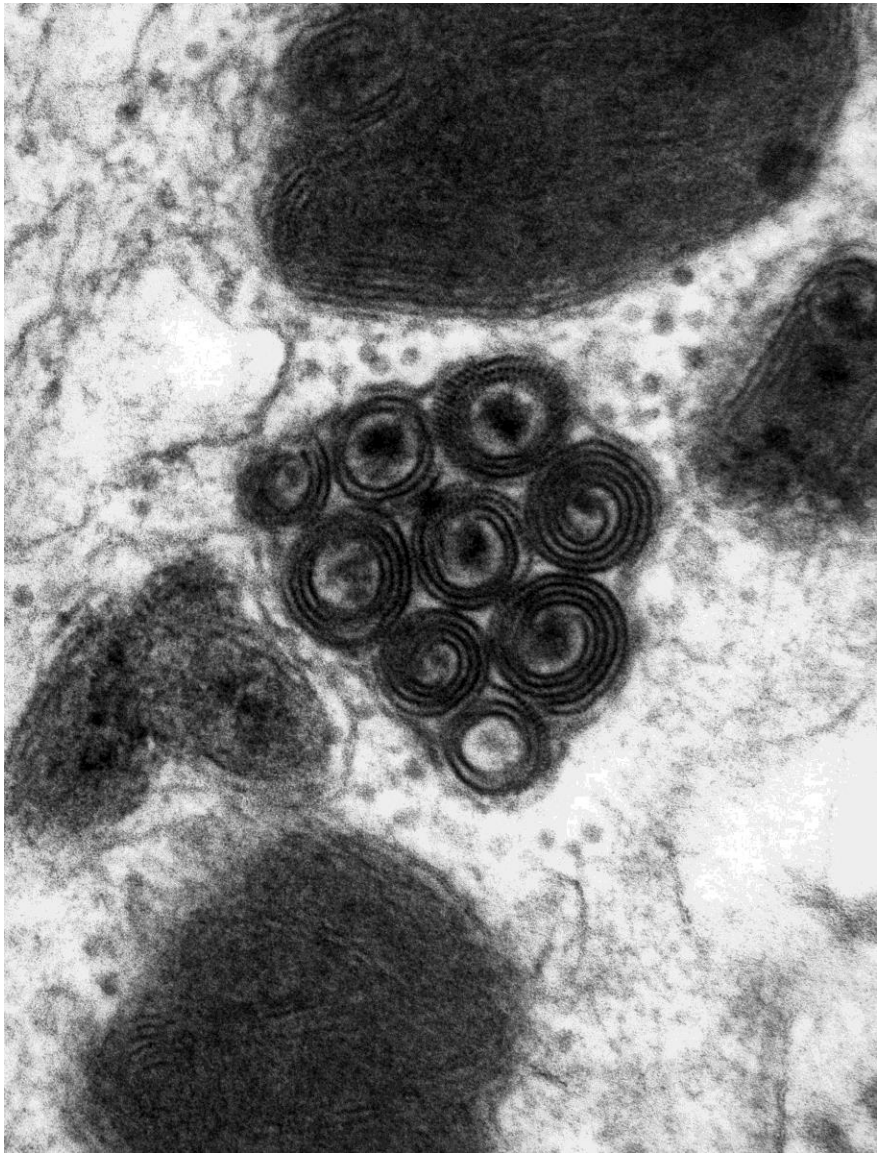
Mast cell in renal interstitium



Mast cell granules

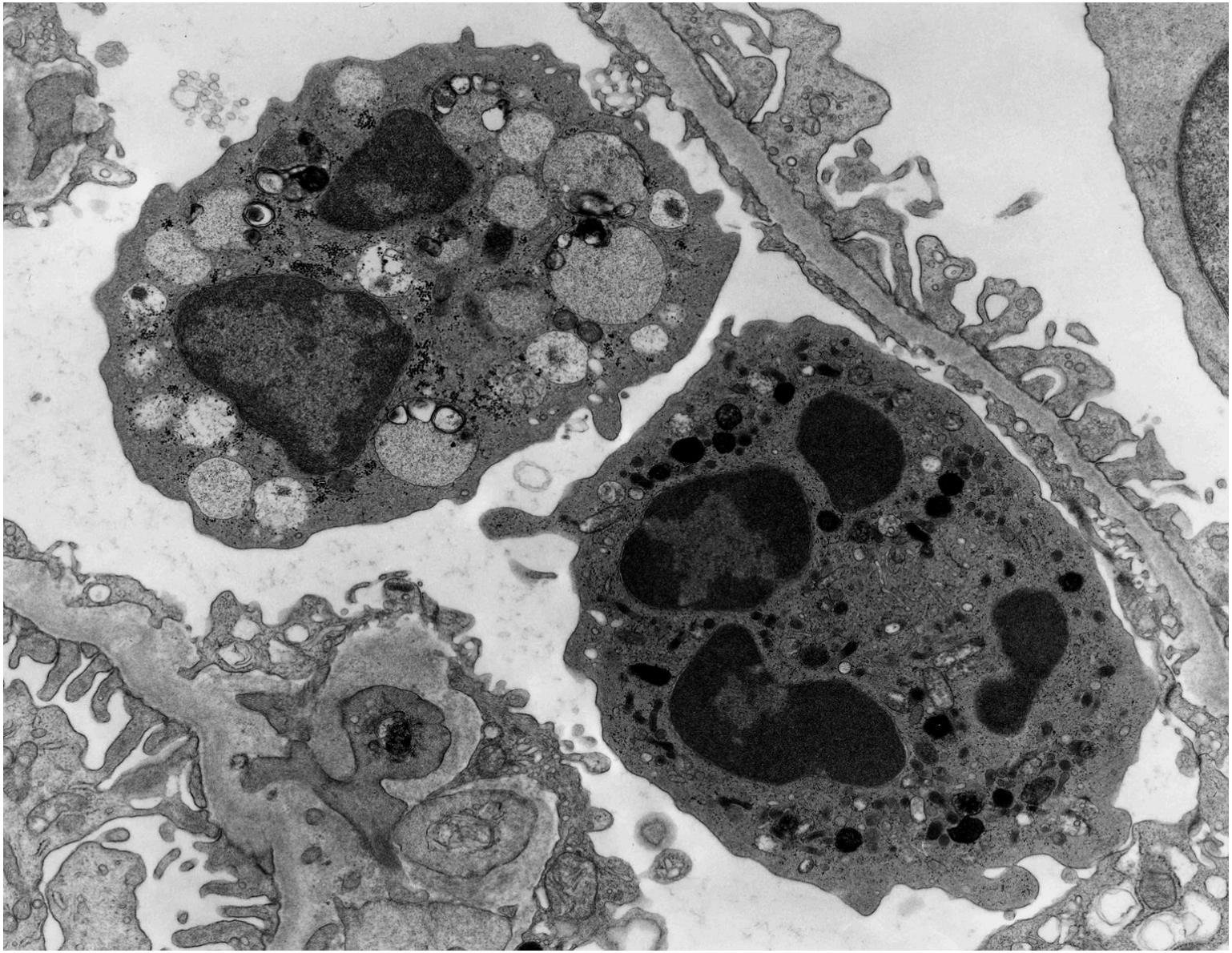


From skin biopsy

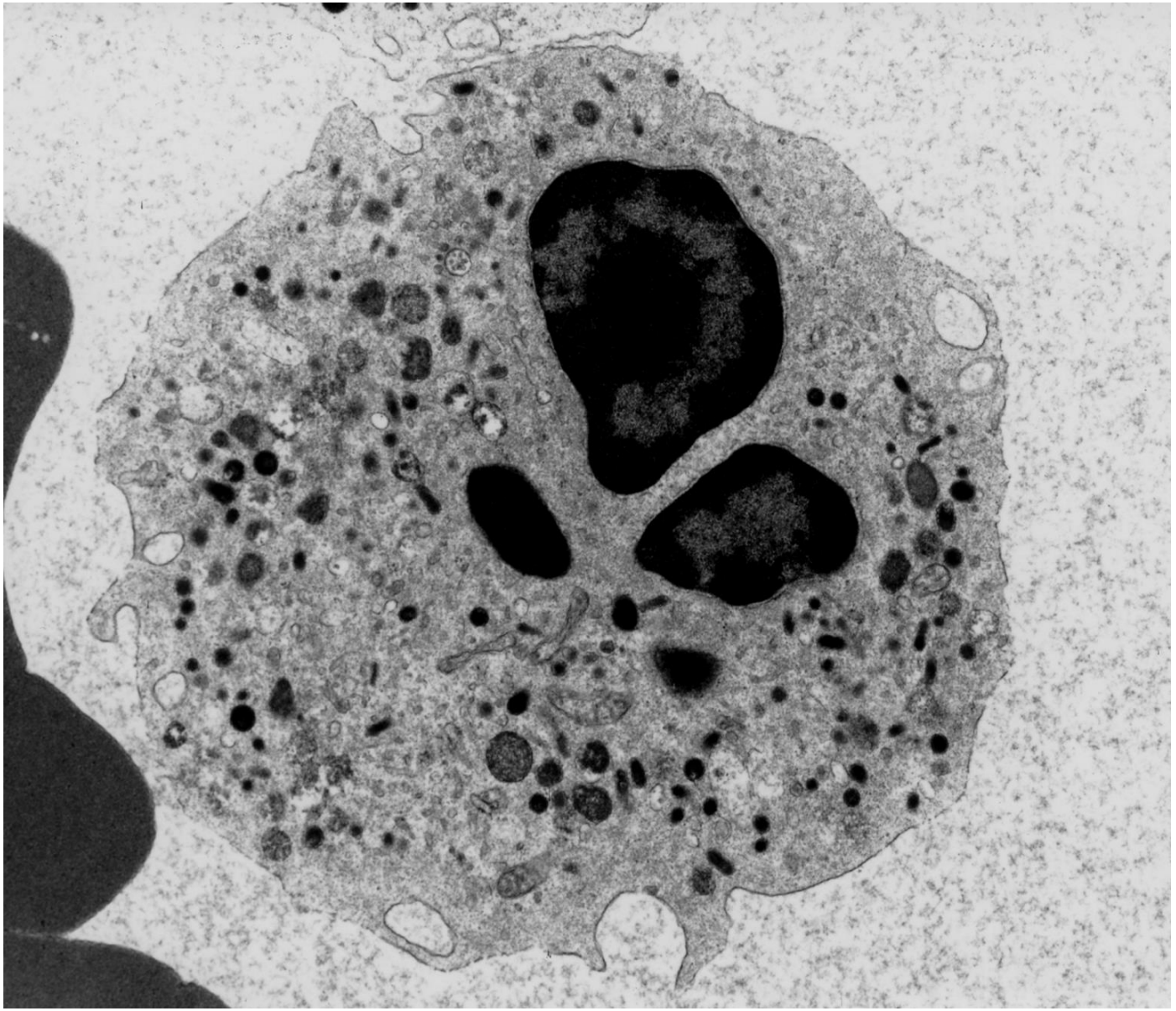


From gastric biopsy

Basophil and neutrophil

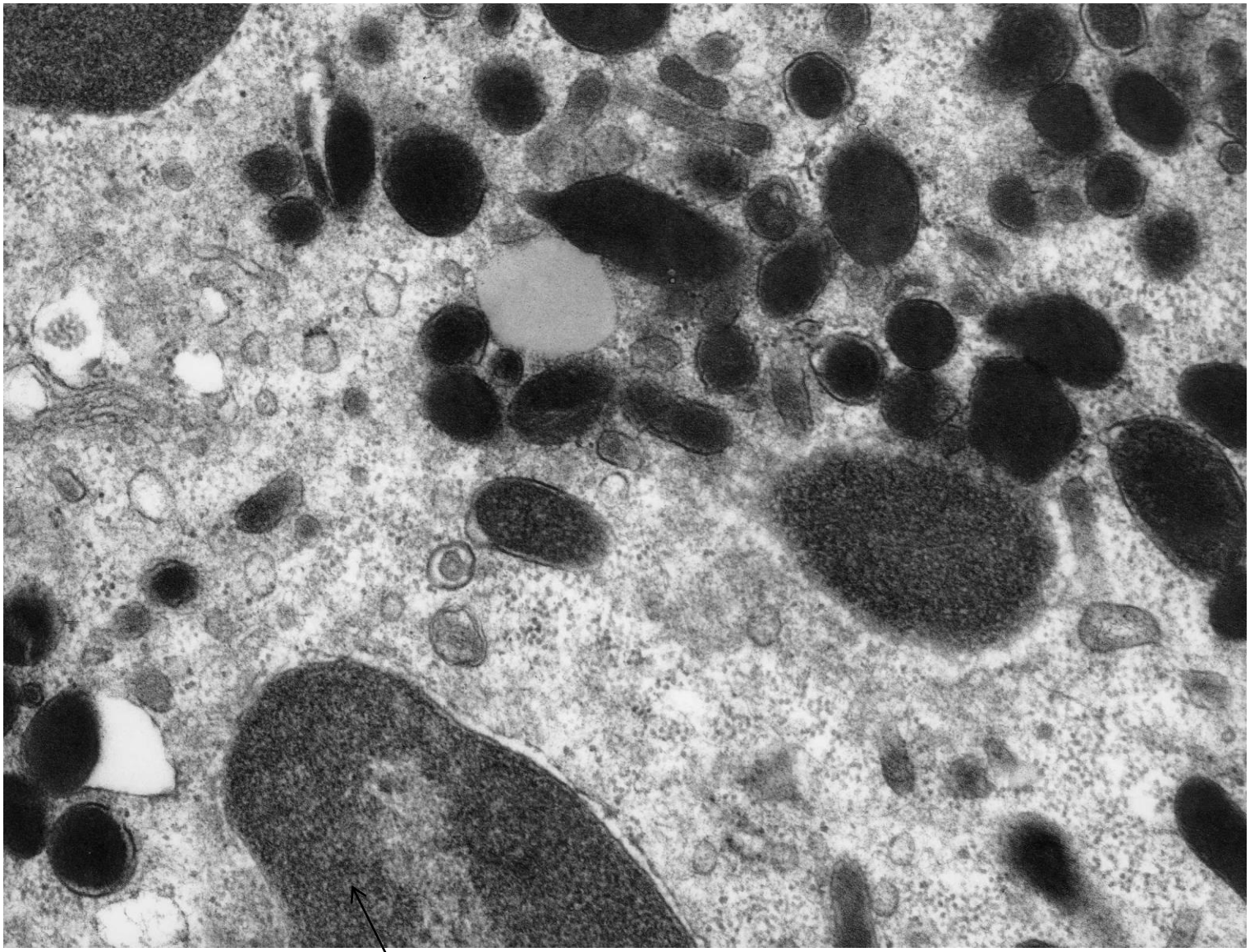


Neutrophil in venous blood



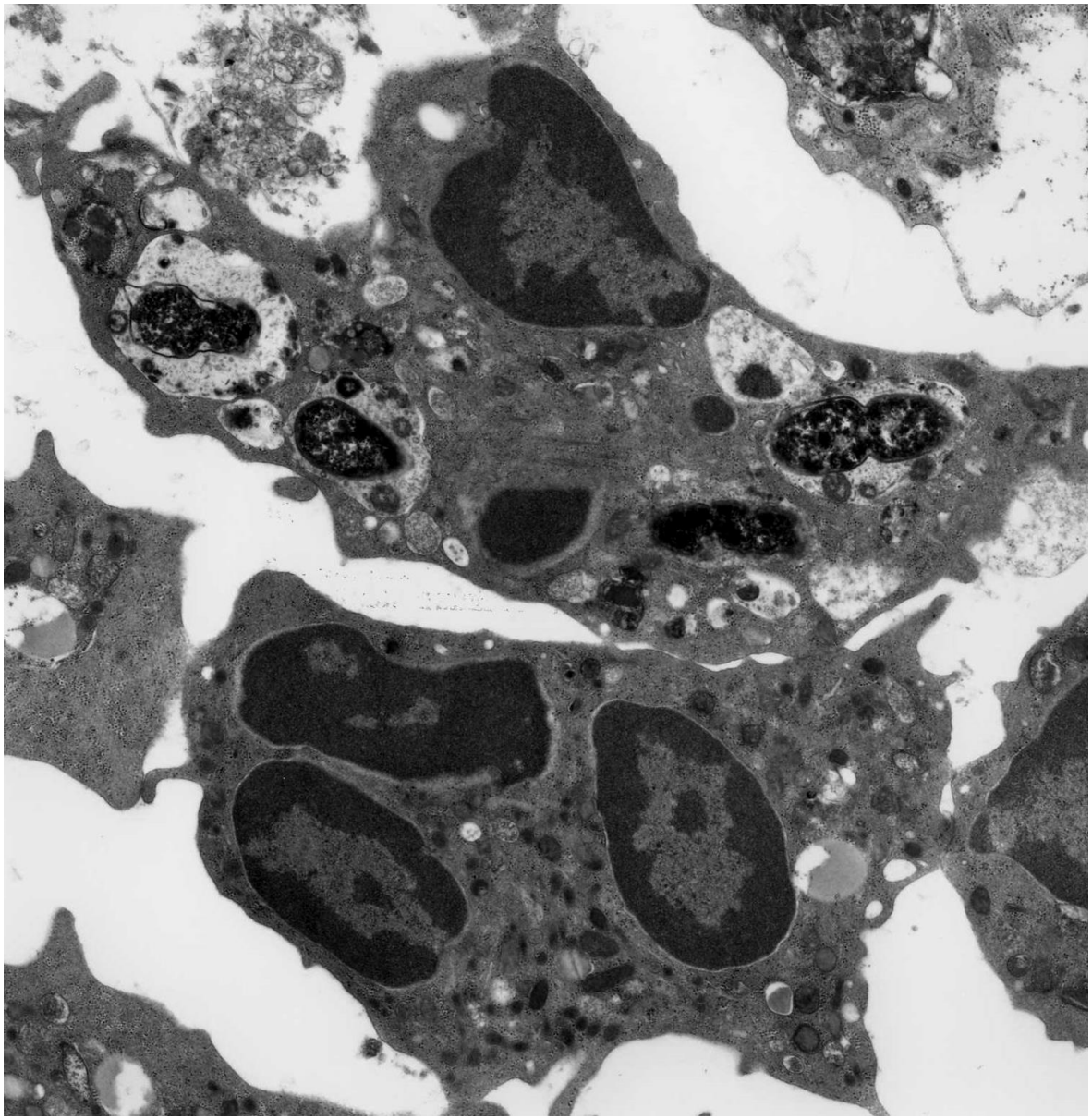
Poly-lobated nucleus, numerous small granules

Neutrophil – different cell to previous picture

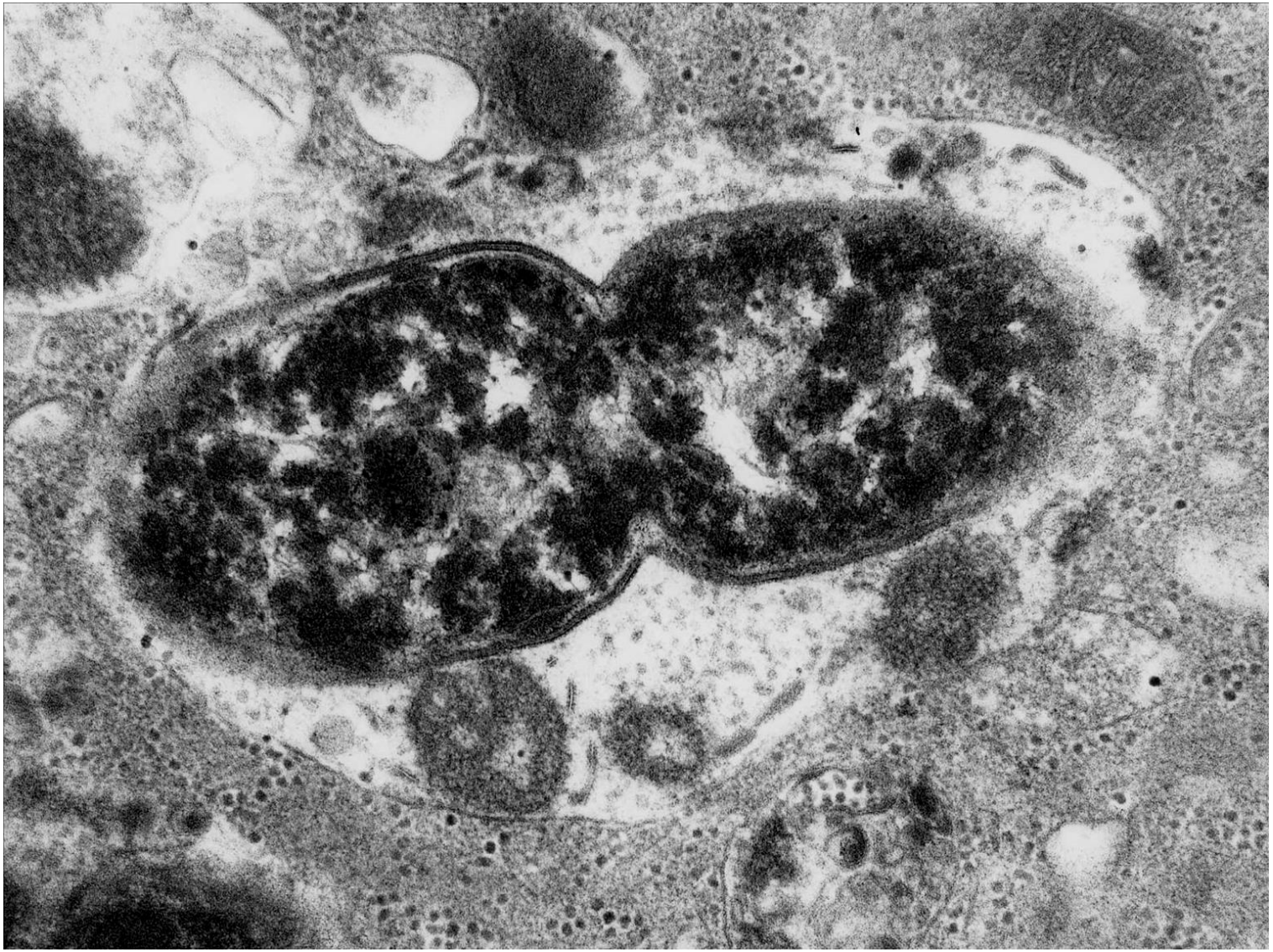


Abundant heterochromatin

E coli pyelonephritis – two neutrophils

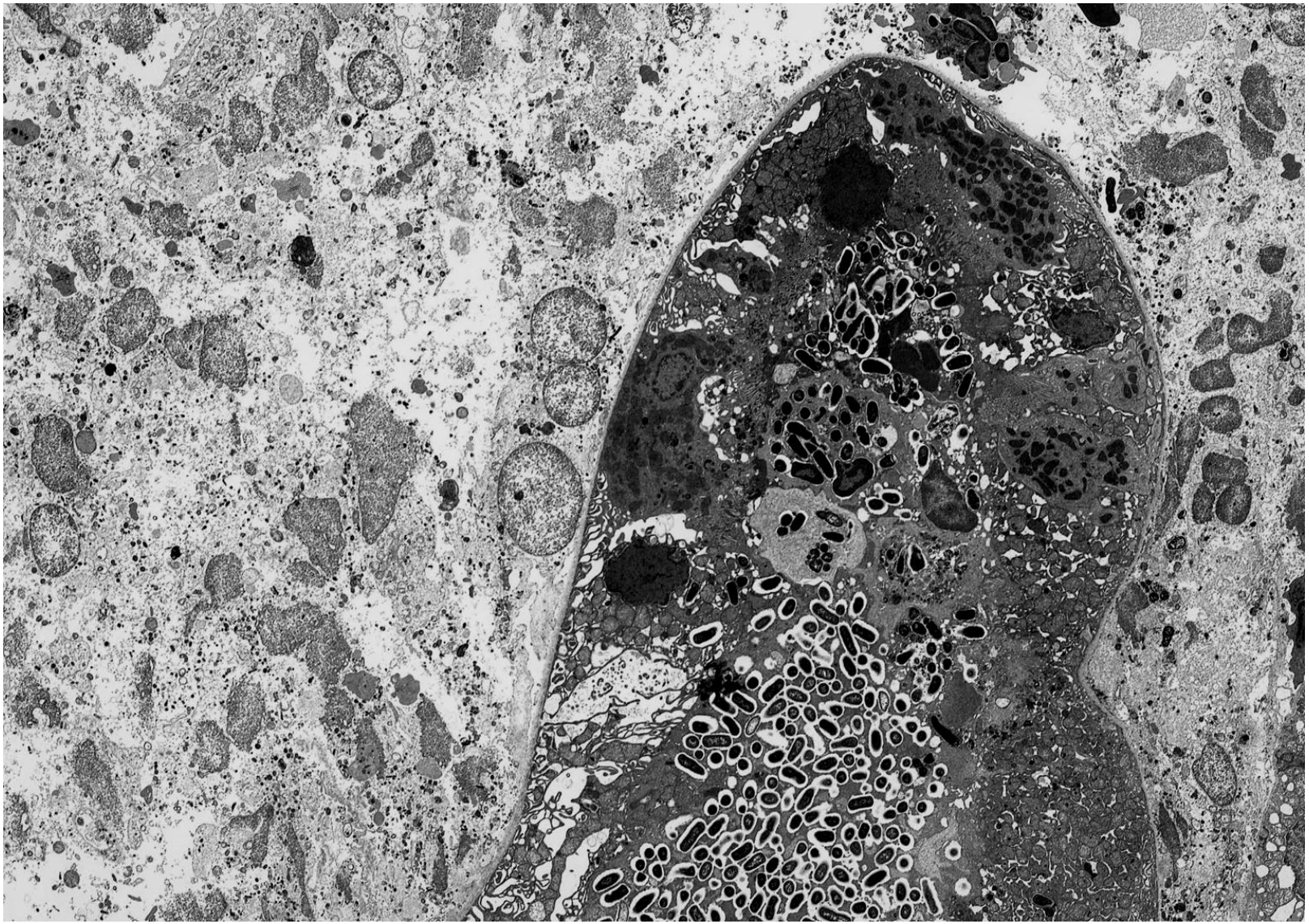


Higher magnification of previous slide



Degenerate E coli Gram negative bacterium arrested in division within neutrophil phagosome

Pyelonephritis in transplant kidney. Patient anuric.



Area of liquifaction.

Necrotic neutrophils

E.Coli and neutrophils in lumen of proximal convoluted tubule.

Granular cast.

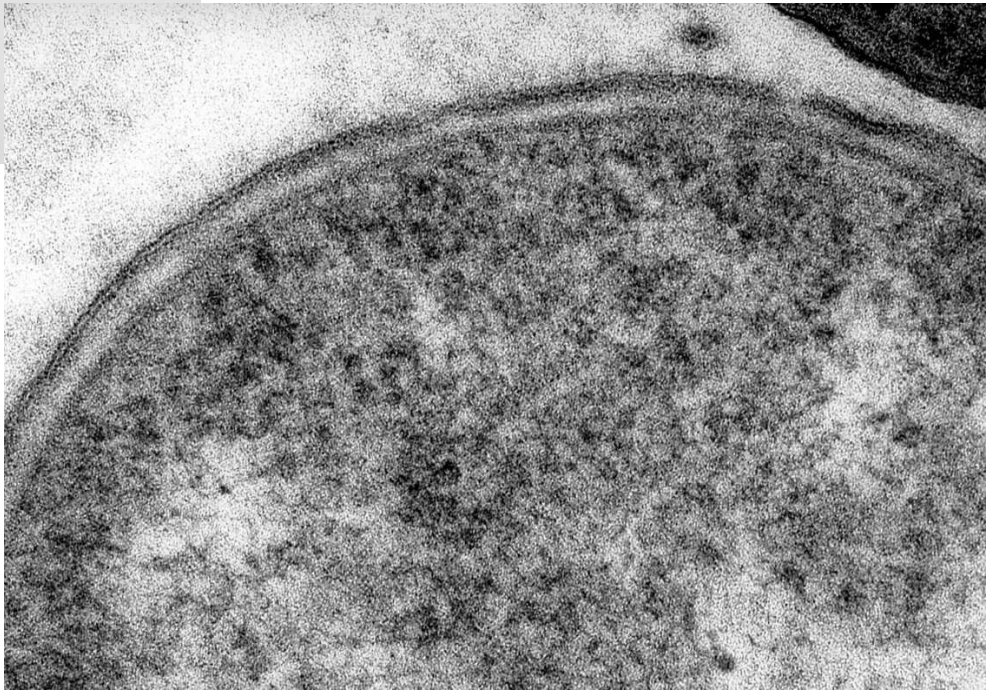
Pyelonephritis

E. coli in lumen of tubule

Staph aureus – in vitro

Gram positive organism

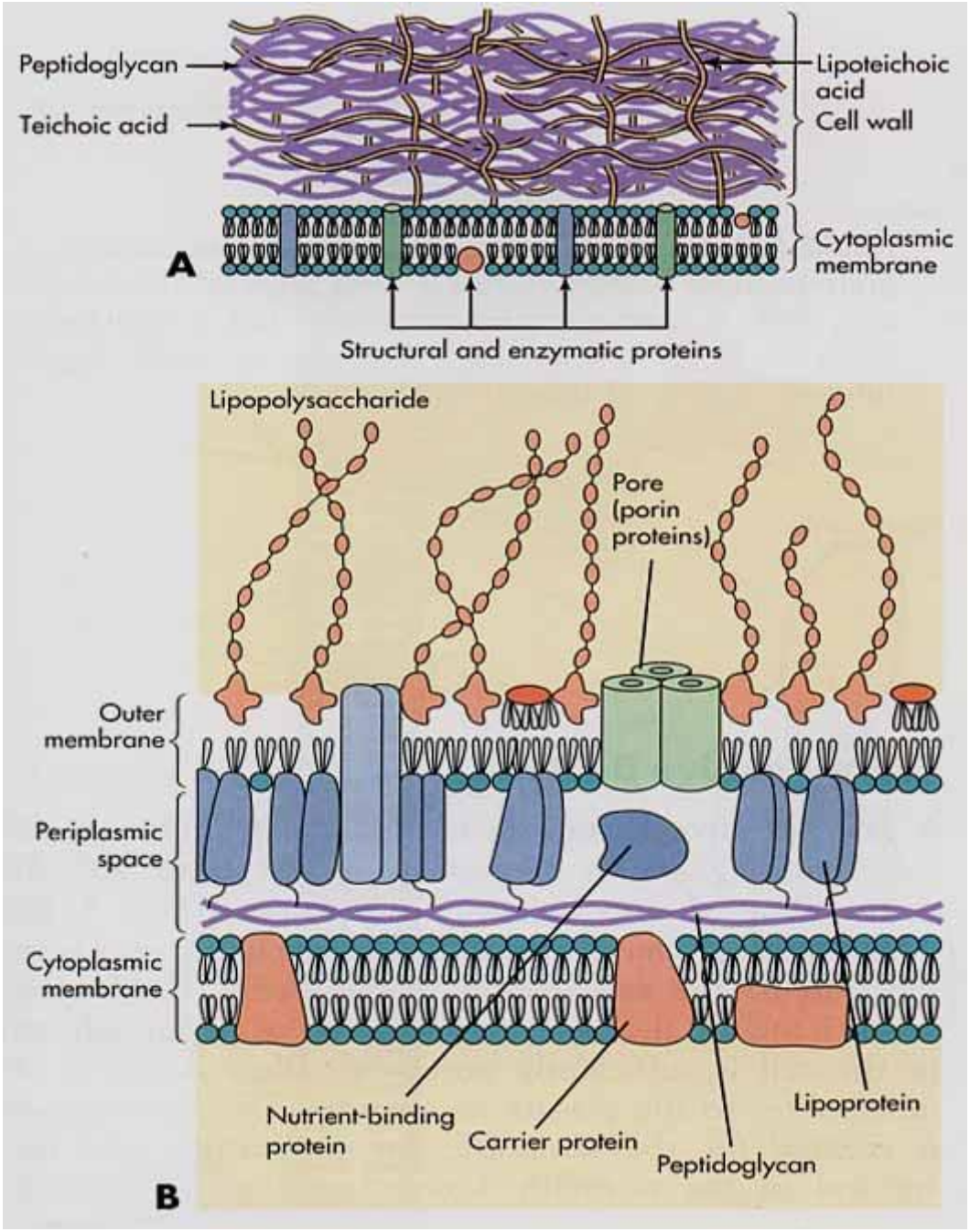
Thick peptidoglycan layer & no outer membrane



Slightly swollen E. coli – in vitro

Gram negative organism

Inner and outer membrane



Google images

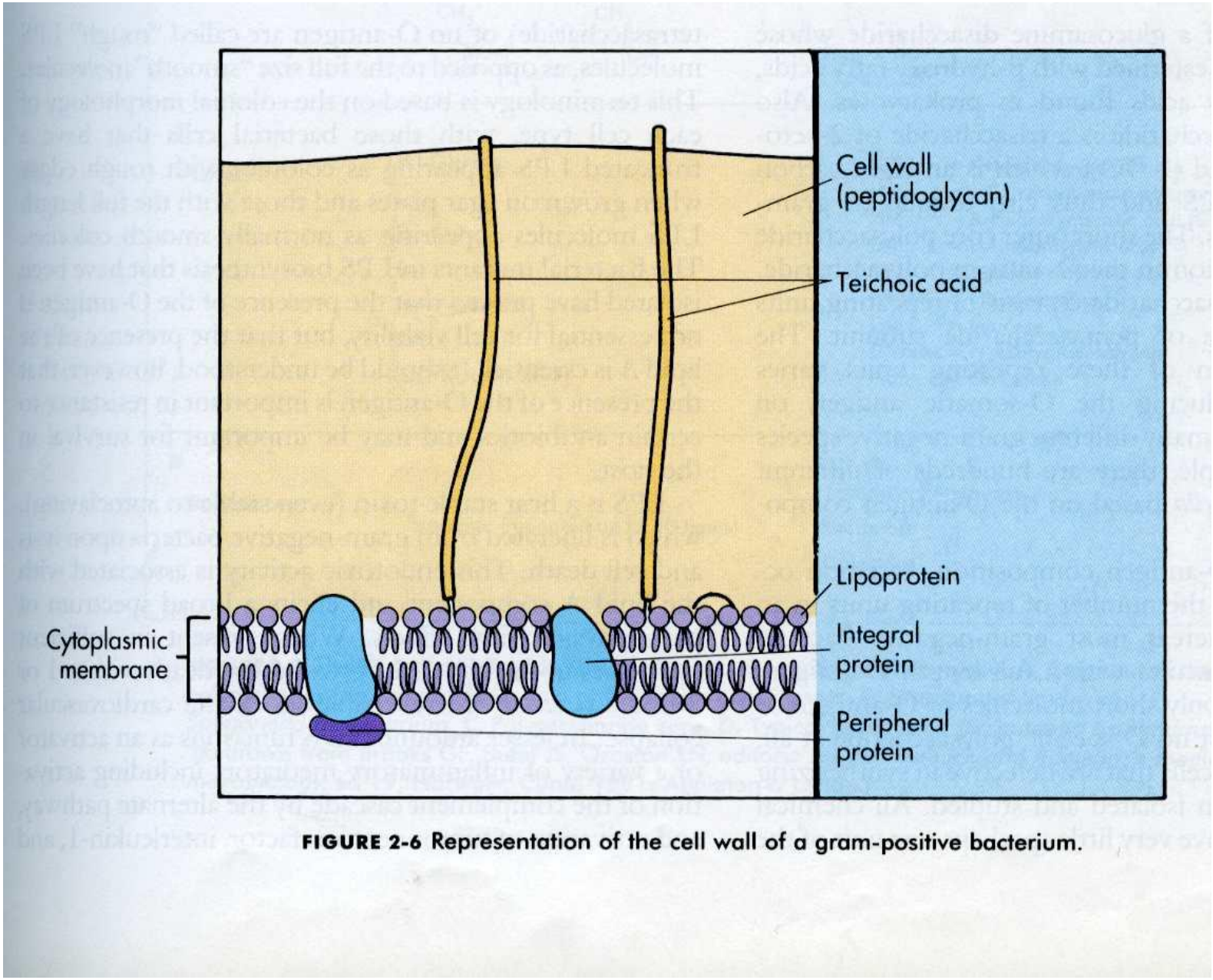


FIGURE 2-6 Representation of the cell wall of a gram-positive bacterium.

Medical Microbiology 2nd edition Murray et al (1994) page 11

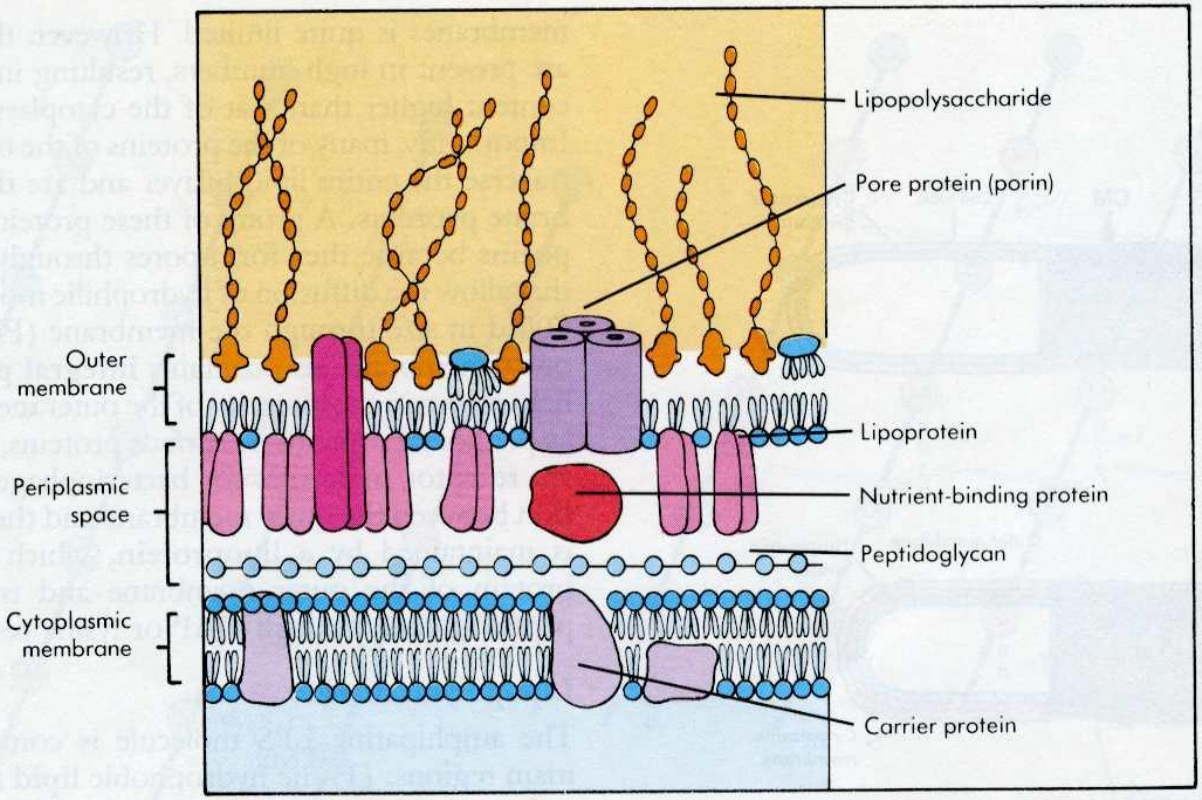
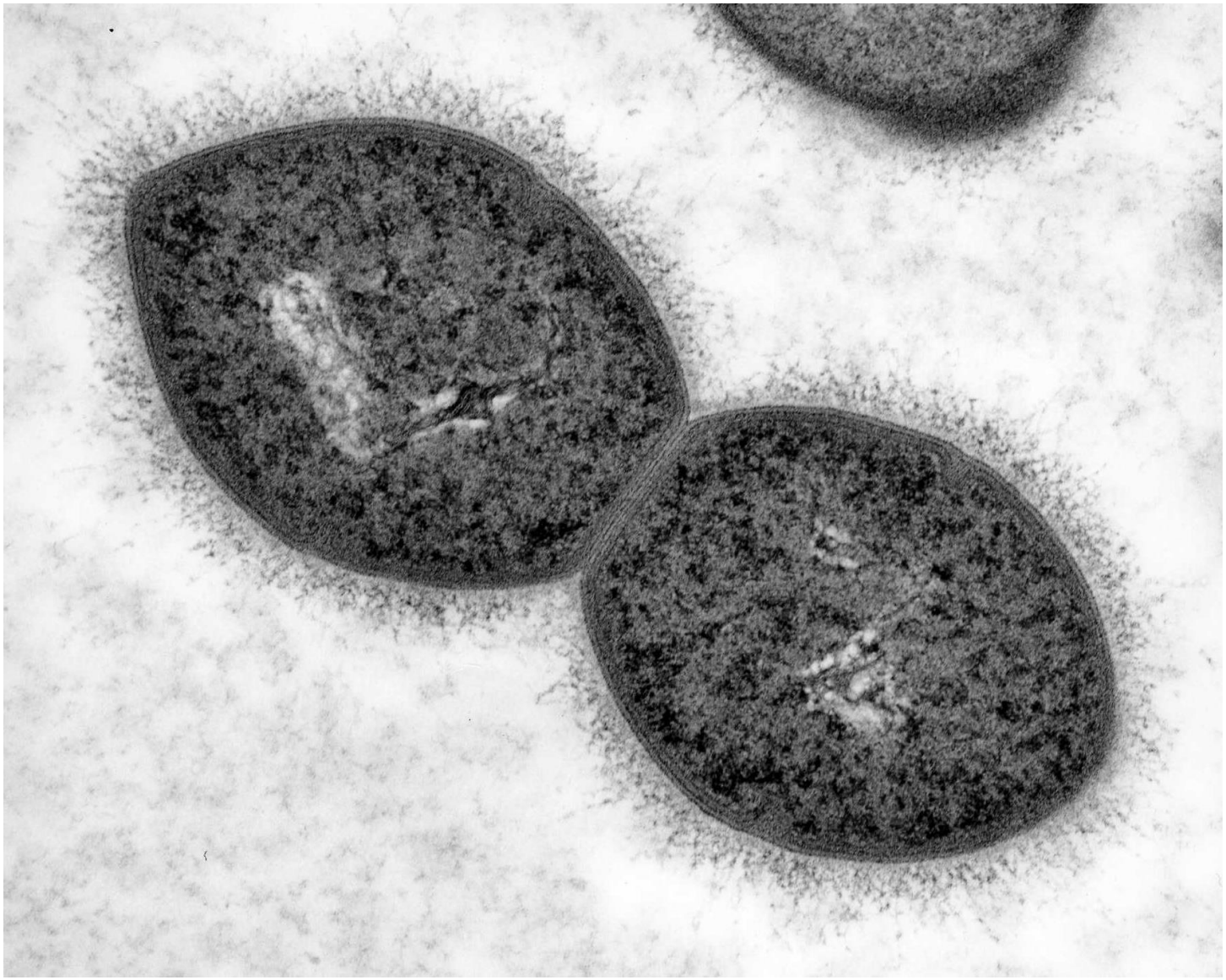


FIGURE 2-7 Representation of the gram-negative cell envelope. The innermost layer surrounding the cell cytoplasm is the cytoplasmic membrane. Carrier proteins embedded in the membrane facilitate transport of solutes through the membrane barrier. Outside the cytoplasmic membrane is a thin peptidoglycan layer and an outer membrane. The area between the cytoplasmic membrane and the outer membrane is referred to as the periplasmic space and is filled with hydrated peptidoglycan and binding proteins for nutrients. Within the outer membrane porin proteins and other membrane proteins are present. A lipoprotein layer binds the outer membrane to the peptidoglycan layer. Finally, a complex lipopolysaccharide is attached to the outer layer of the outer membrane. (Modified from Newman NG, Nisengard R: *Oral microbiology and immunology,* Philadelphia, 1988, WB Saunders.)

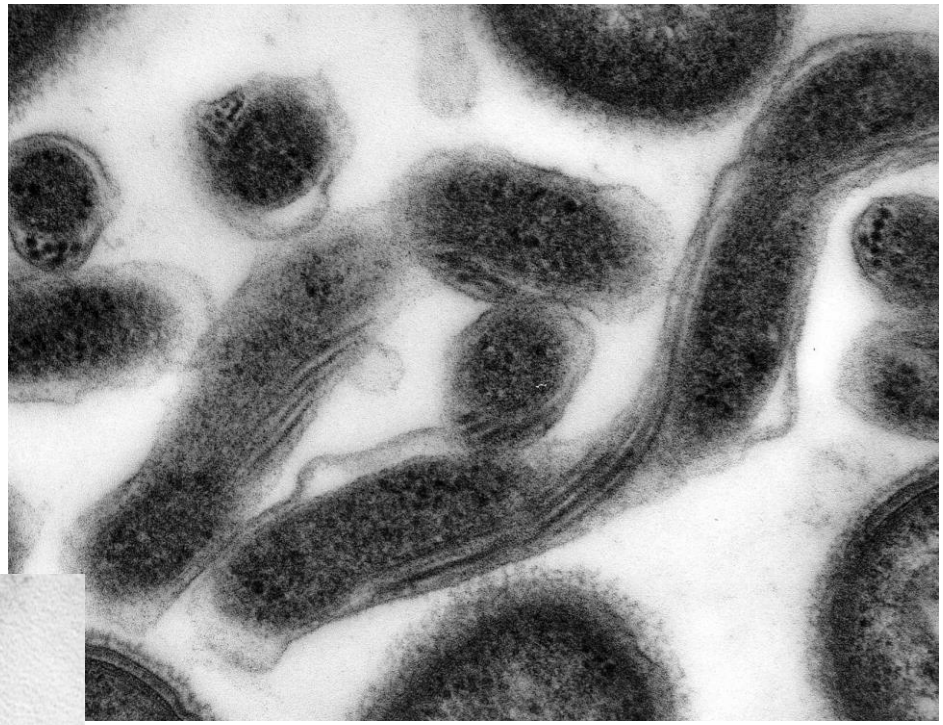
Medical Microbiology 2nd edition Murray et al (1994)

Streptococcus pneumoniae – in vitro

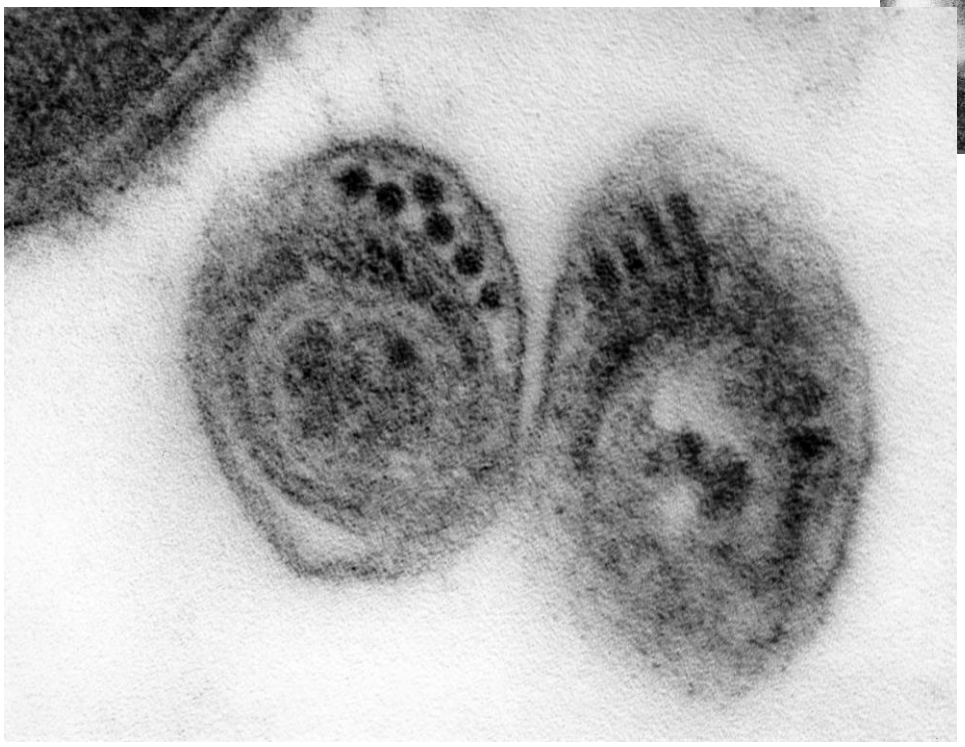


Gram positive organism dividing by forming septum.
Note thick pepidoglycan layer and capsule

Spirochetes from tonsilar crypt colony possibly Borrelia vincentii

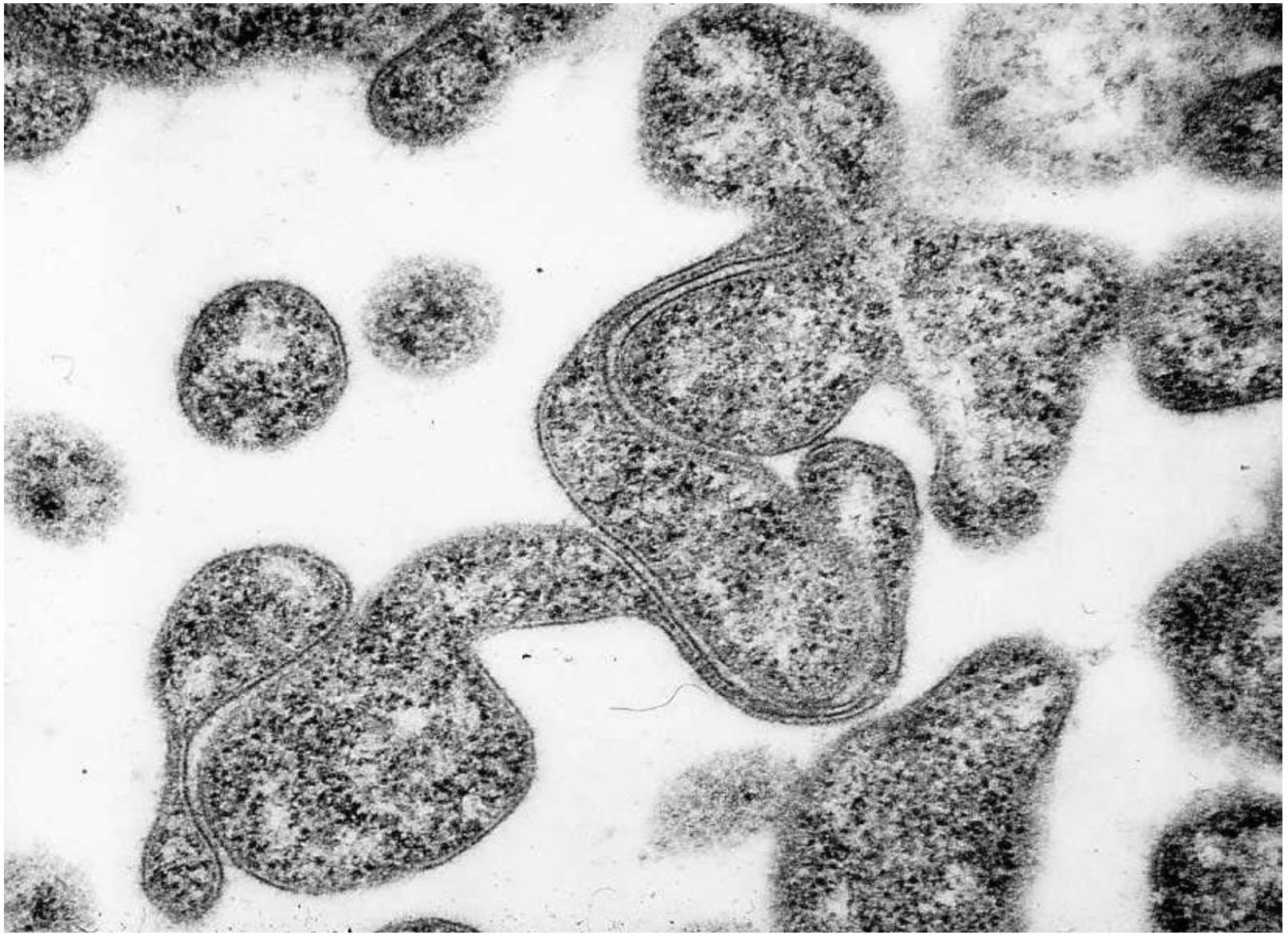


Gram negative spiral bacterium with internal flagellae



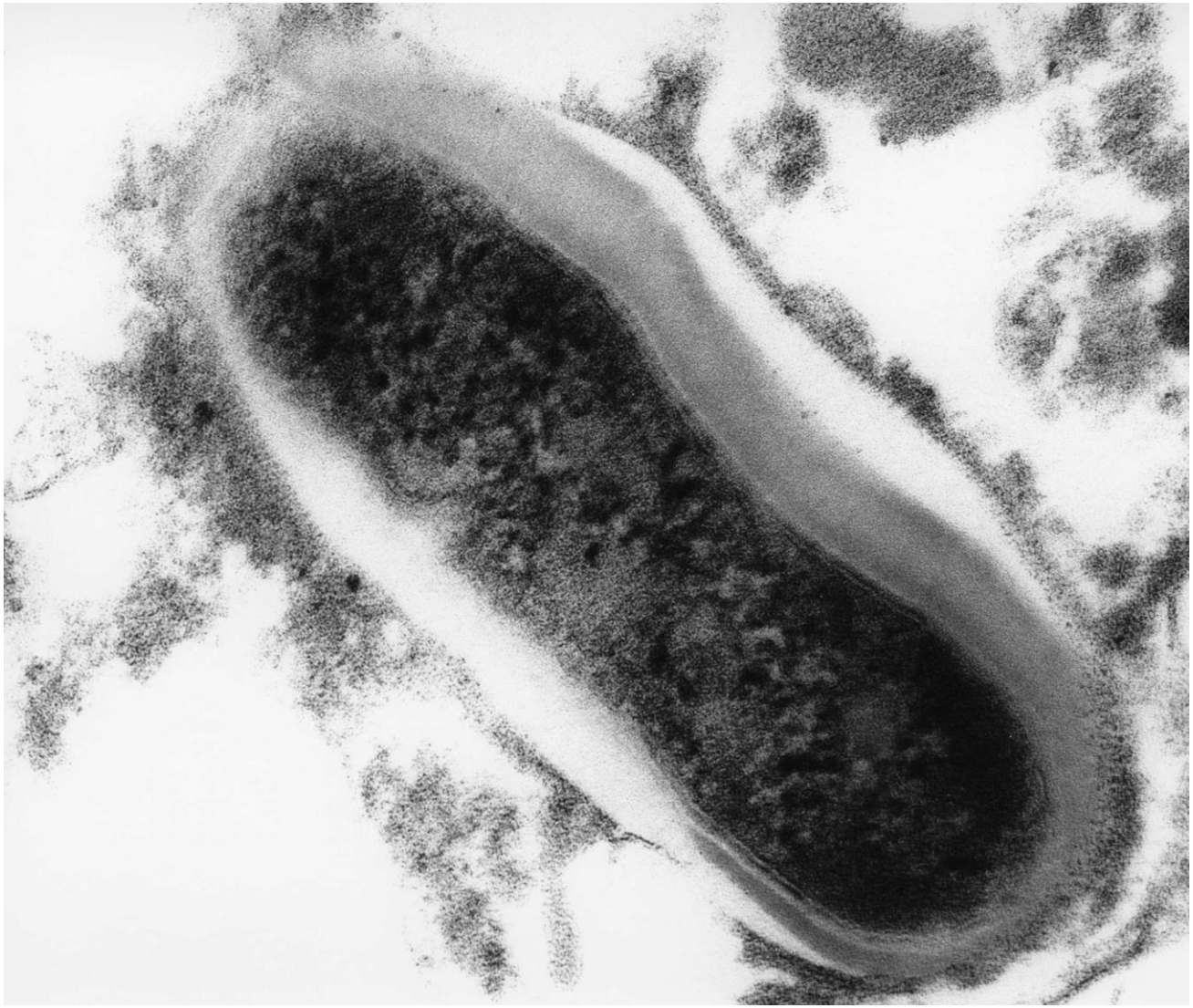
In kidney Leptospirosis or Weil’s disease

Mycoplasma hominis – in vitro



Deformable bacterial with single outer membrane

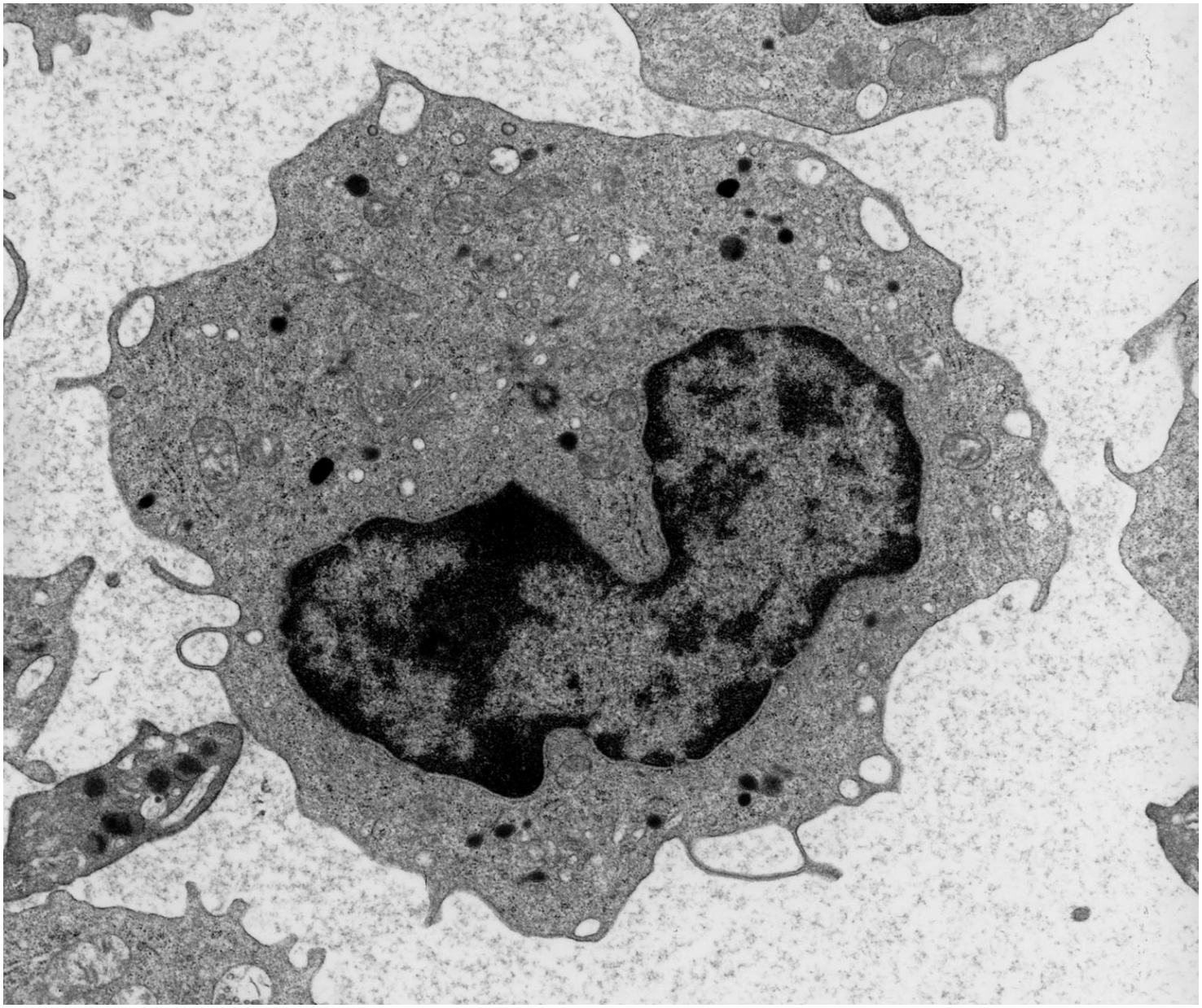
Mycobacterium tuberculosis from case of TB pneumonia



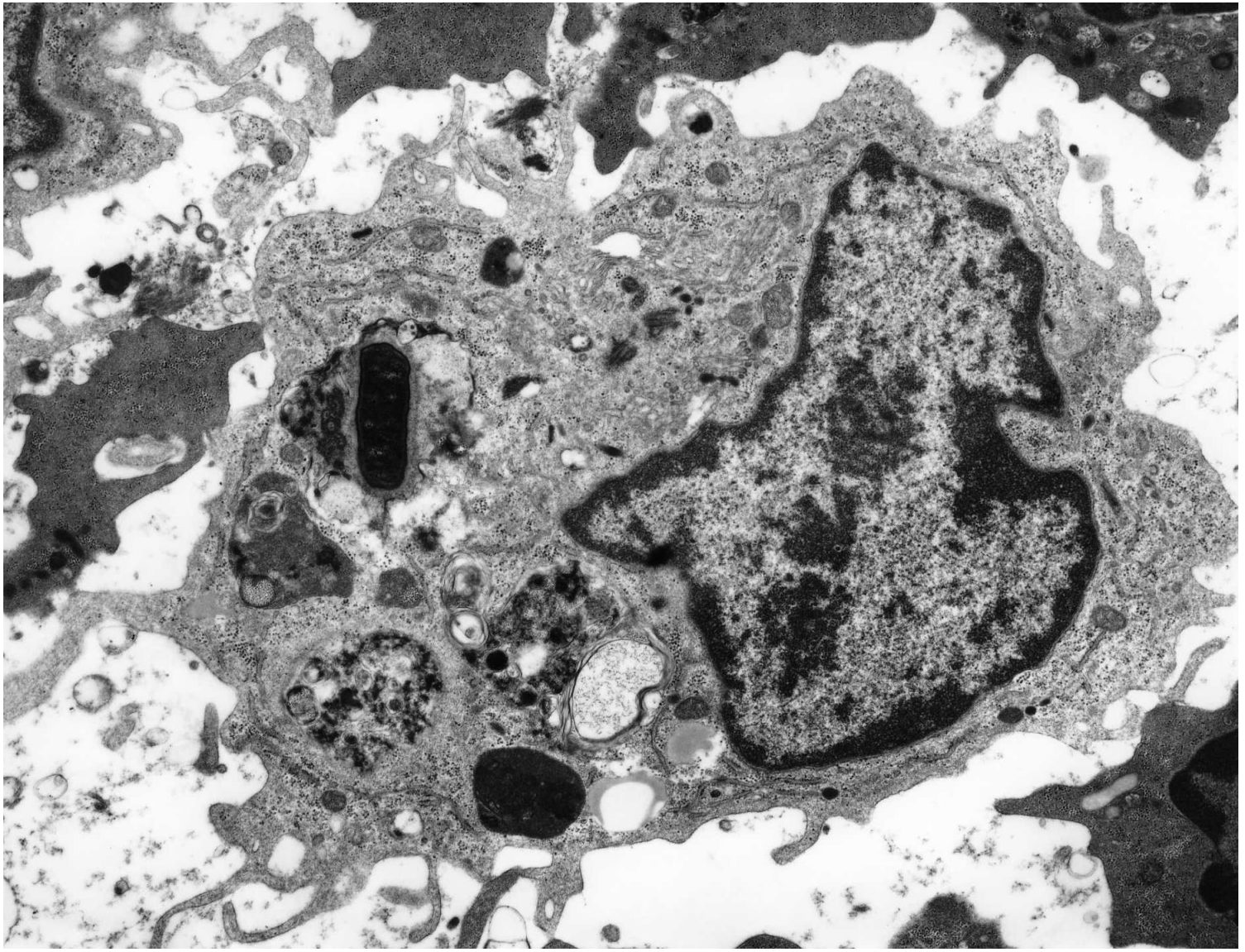
Formalin fixed post mortem lung. Organism within neutrophil.

Thick waxy coat of mycolic acid.

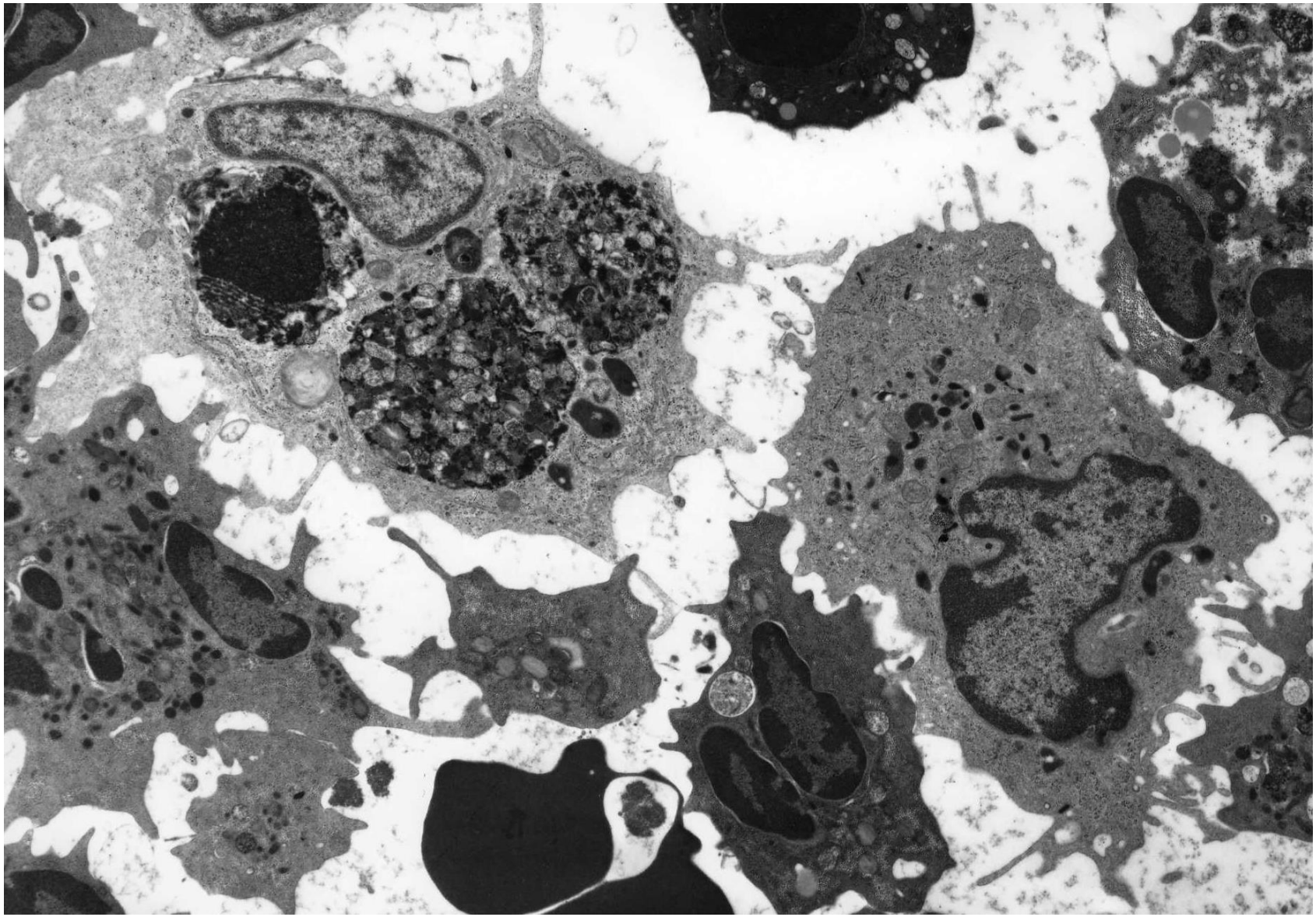
Circulating monocyte



Pyelonephritis – macrophage digesting E coli

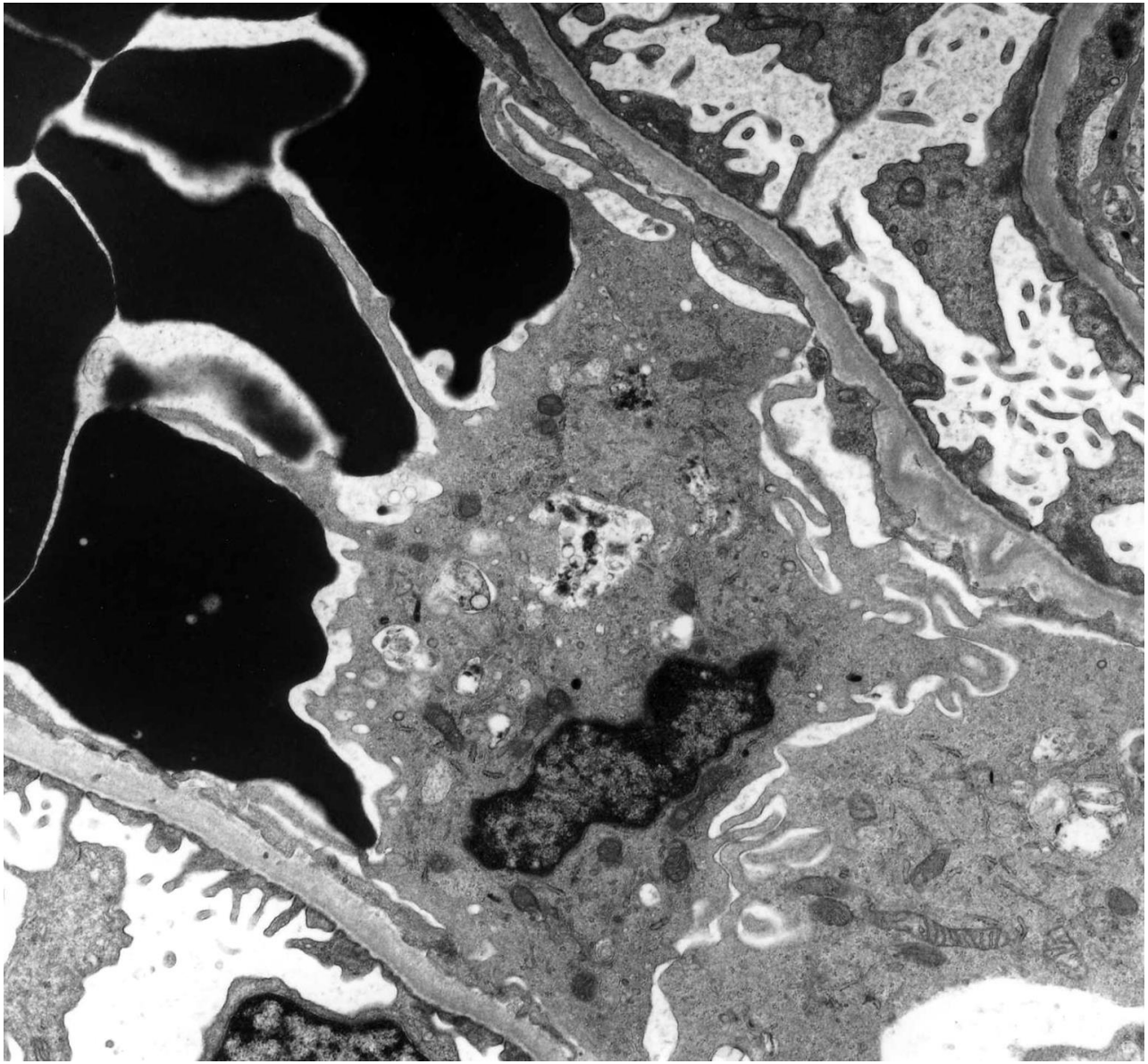


Pyelonephritis



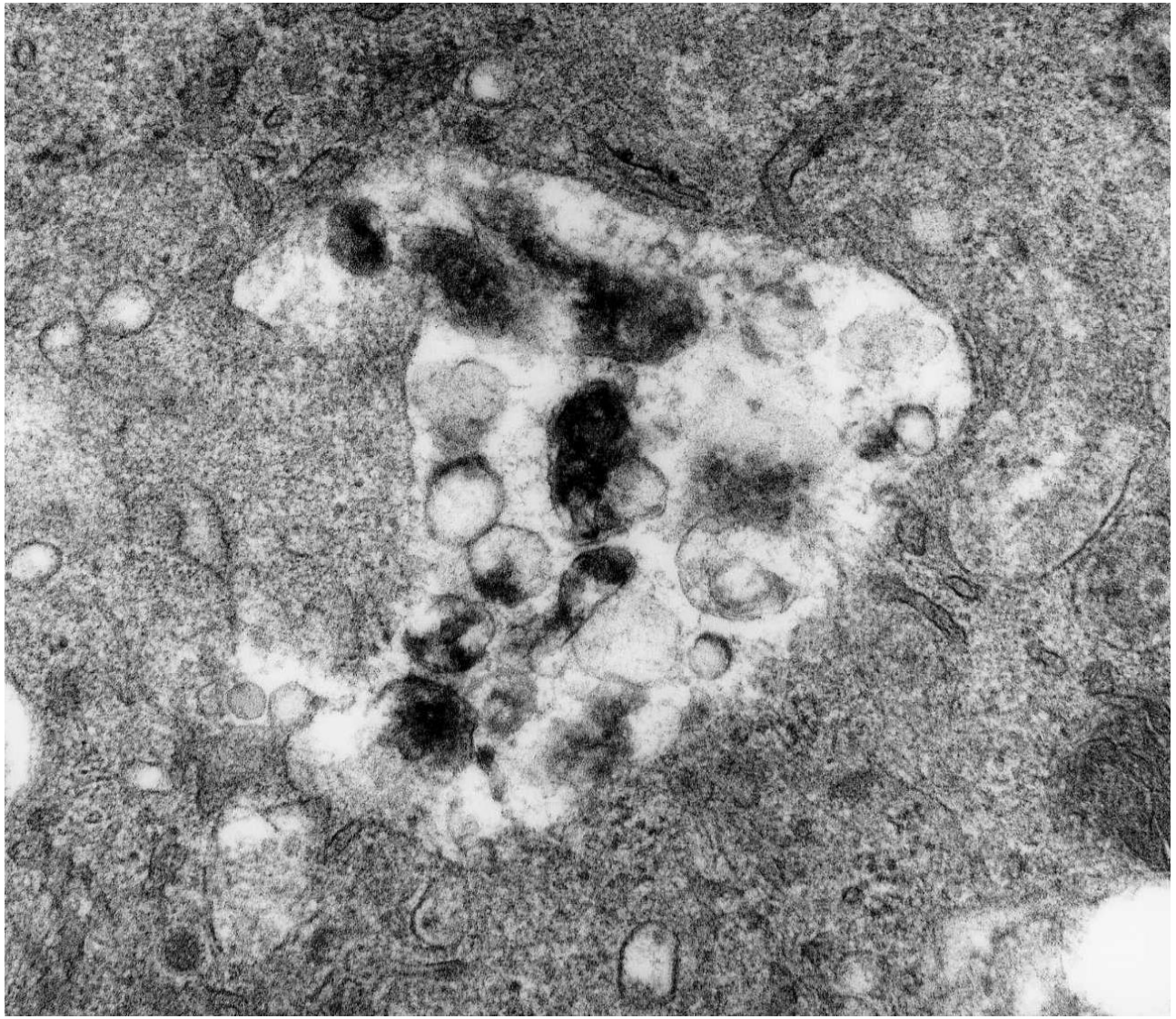
Two macrophages – one digesting effete neutrophils

Circulating dendritic cell – renal transplant biopsy



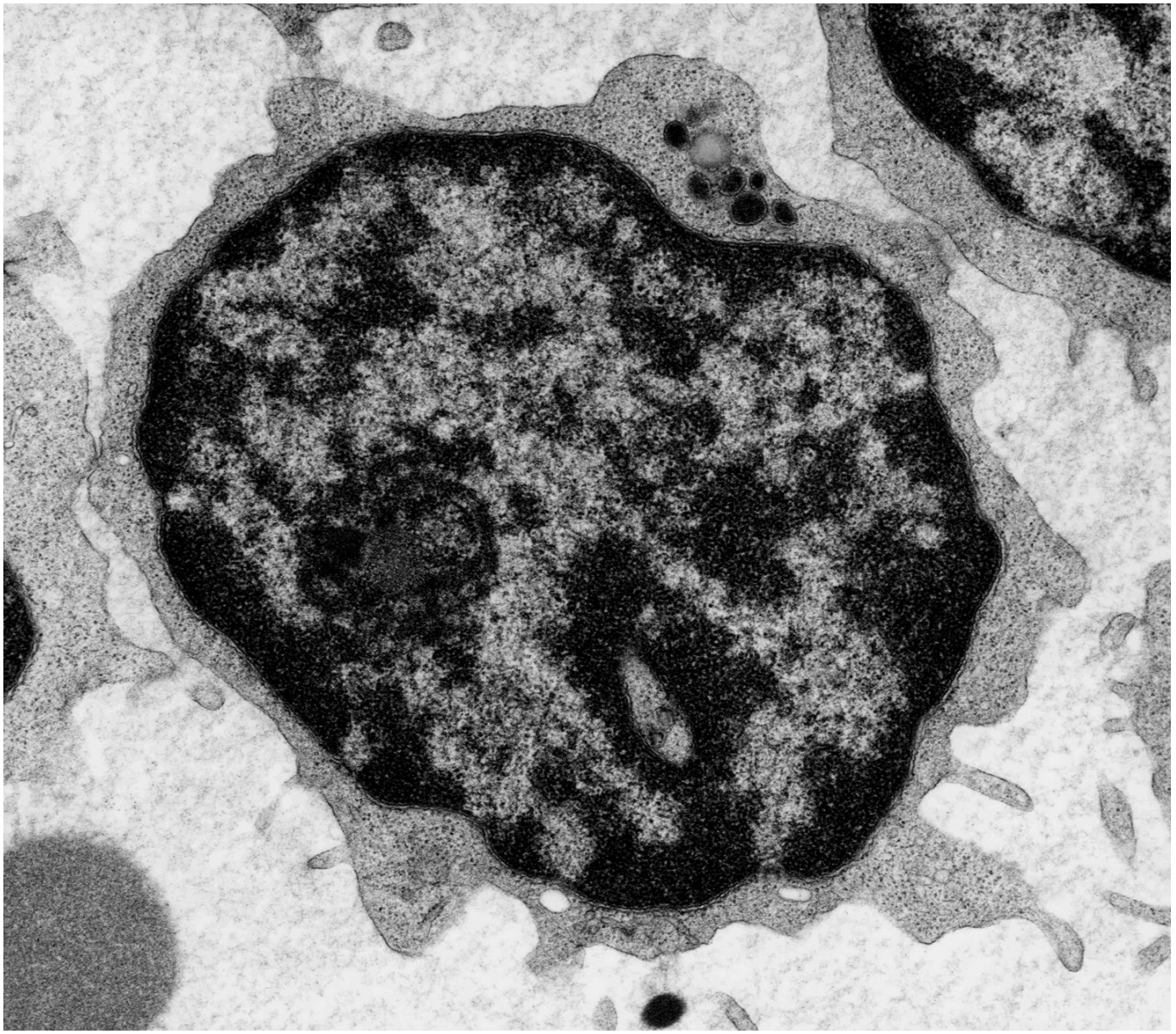
Filopodia

Circulating dendritic cell

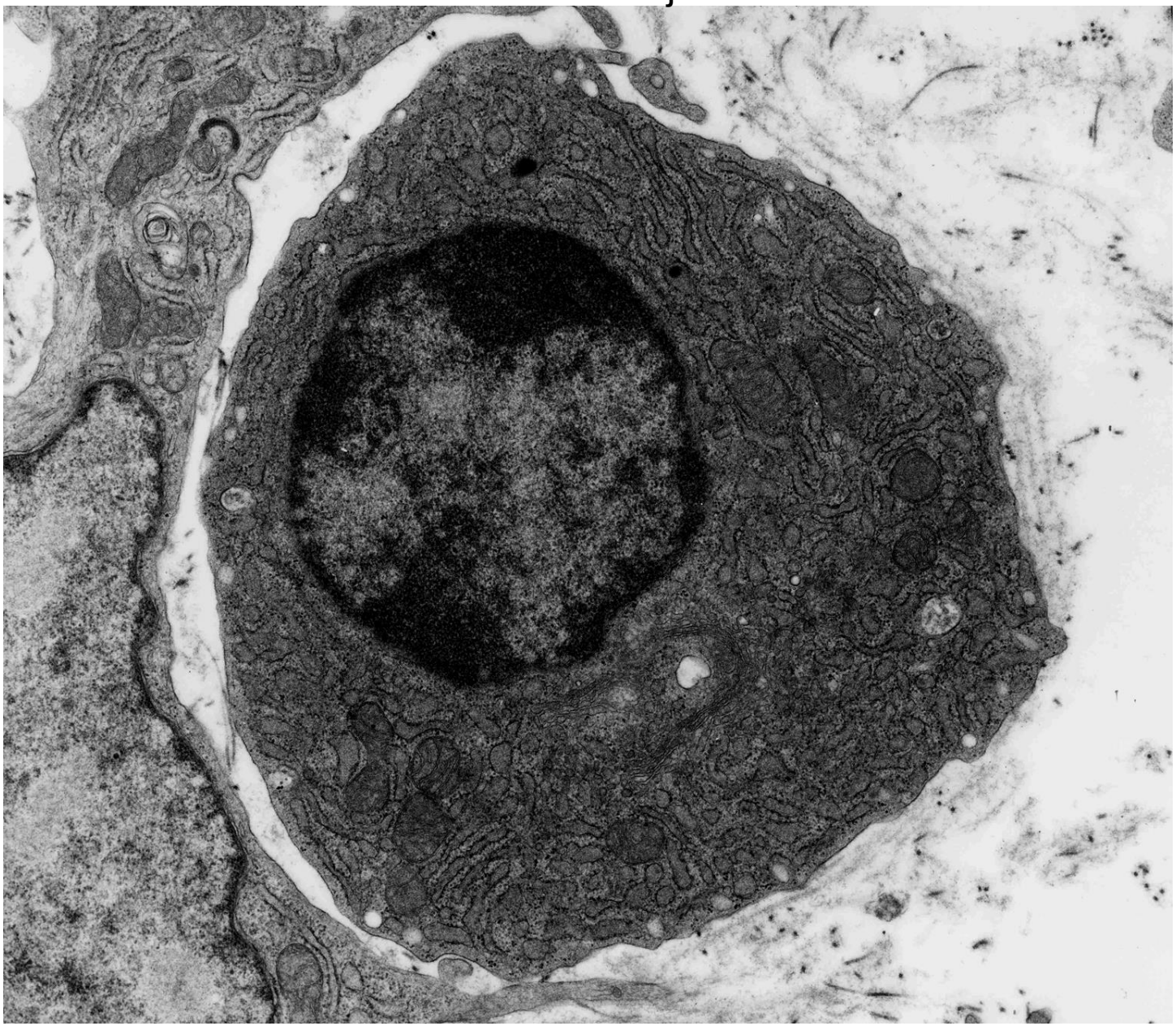


Processed antigen (exosomes) within an endosome

Circulating resting T lymphocyte

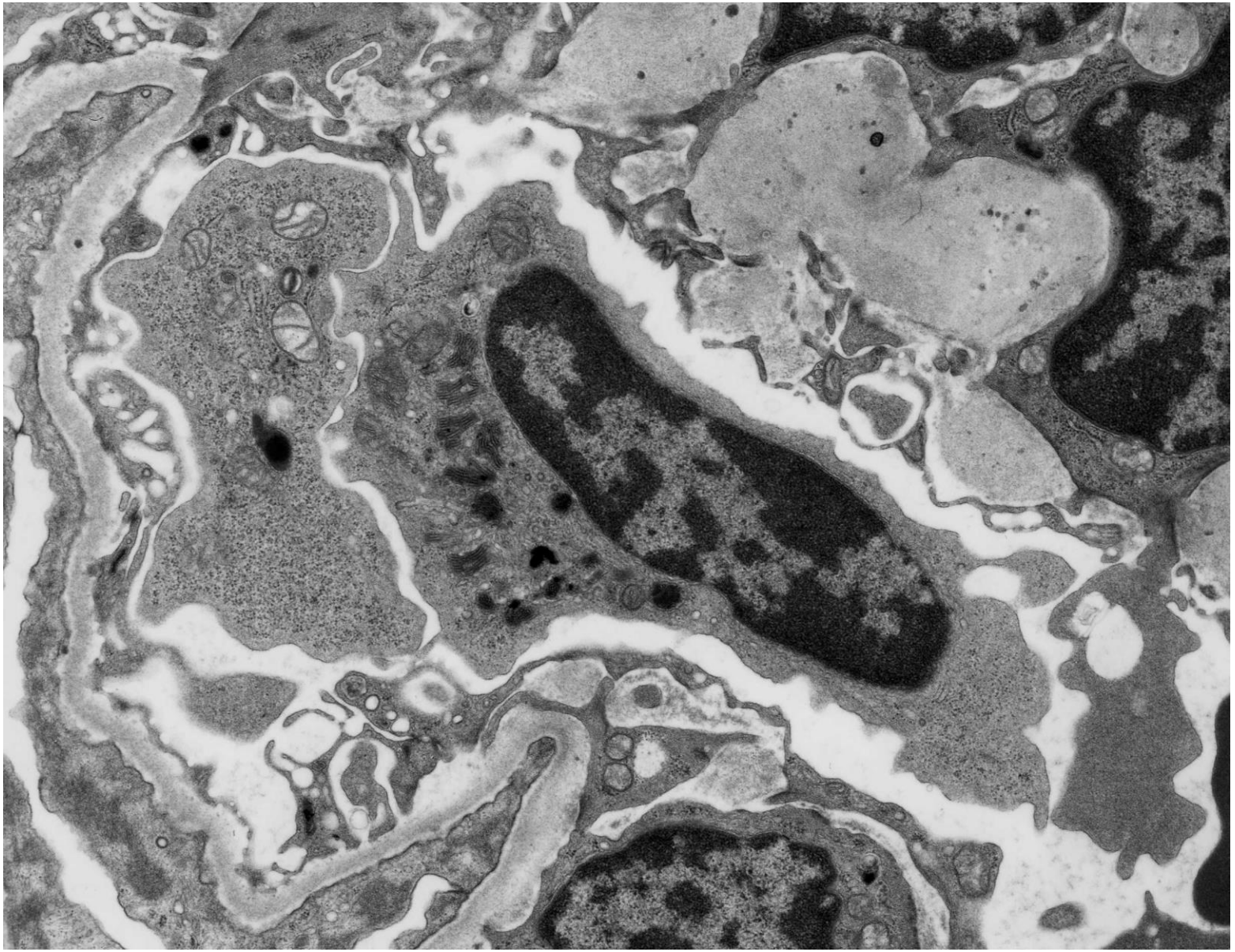


Plasma cell – in renal interstitium adjacent to fibroblast

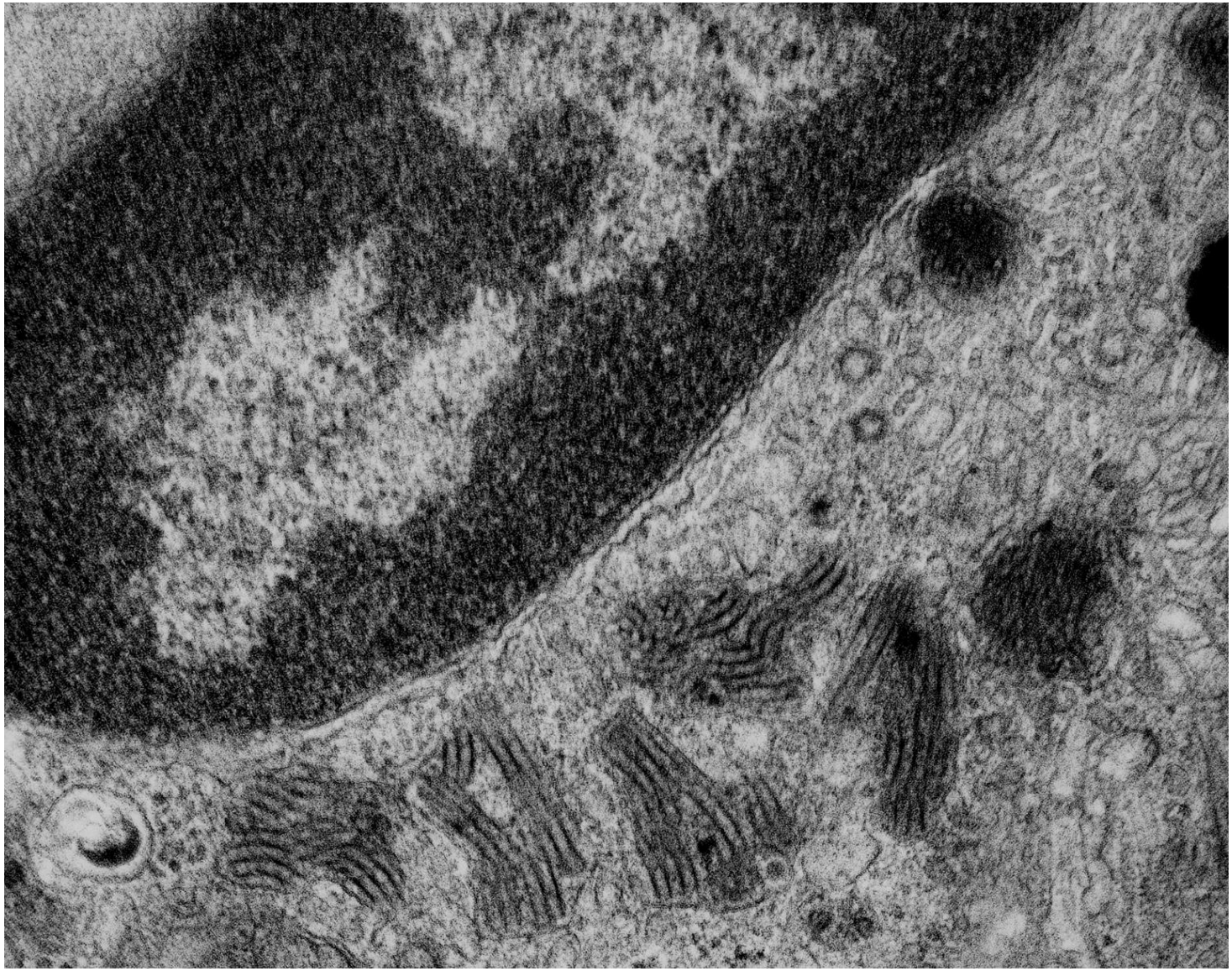


Abundant rough endoplasmic reticulum

Circulating Large Granular Lymphocyte (LGL or NK cell)



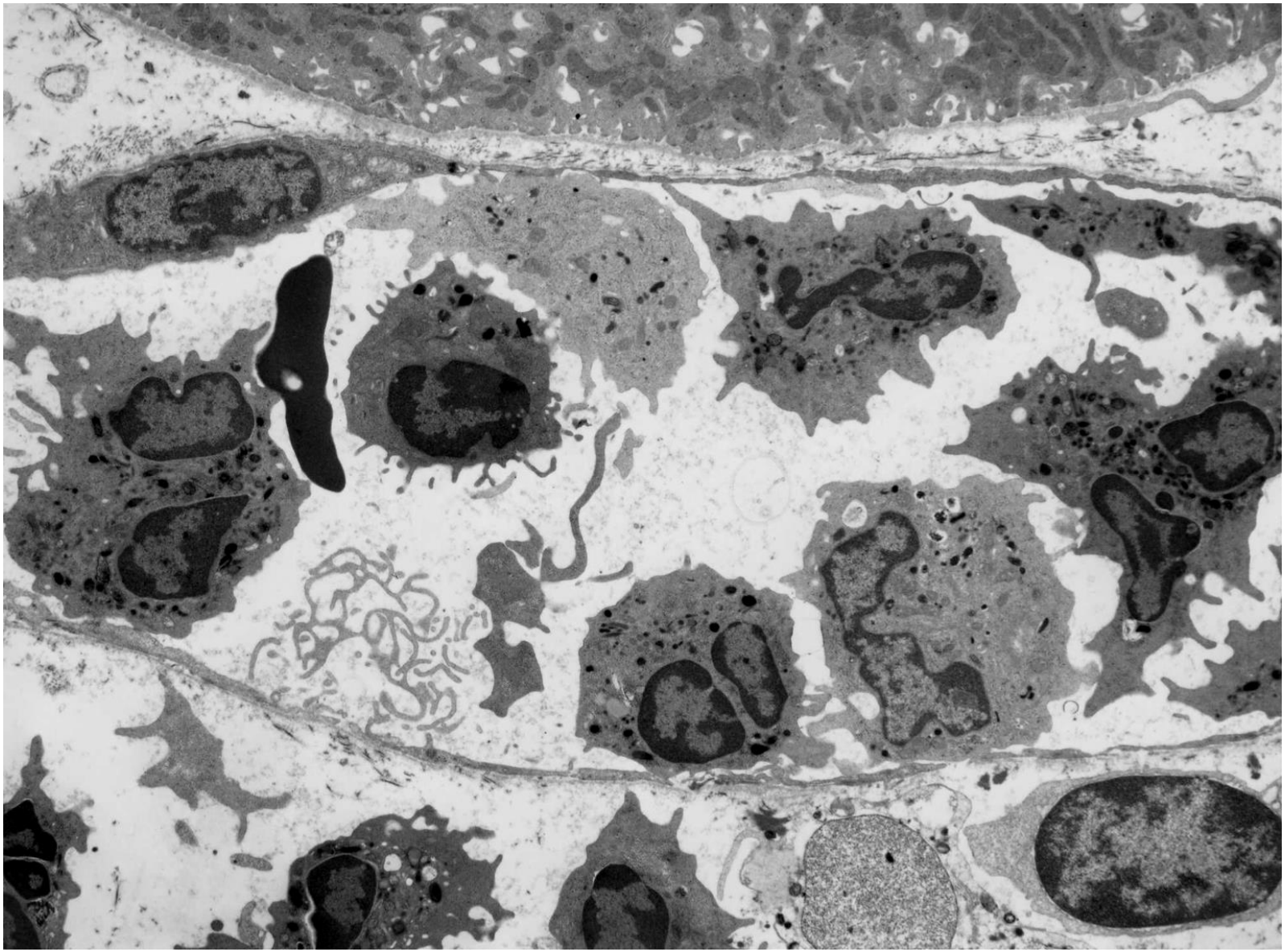
Large Granular Lymphocyte Granules



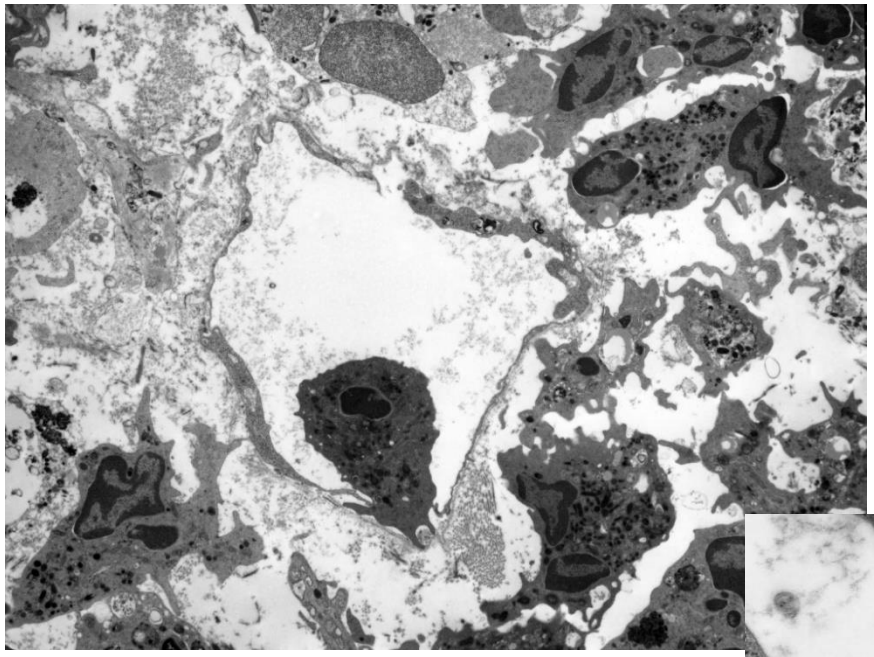
Higher magnification of previous slide

Tubular substructure

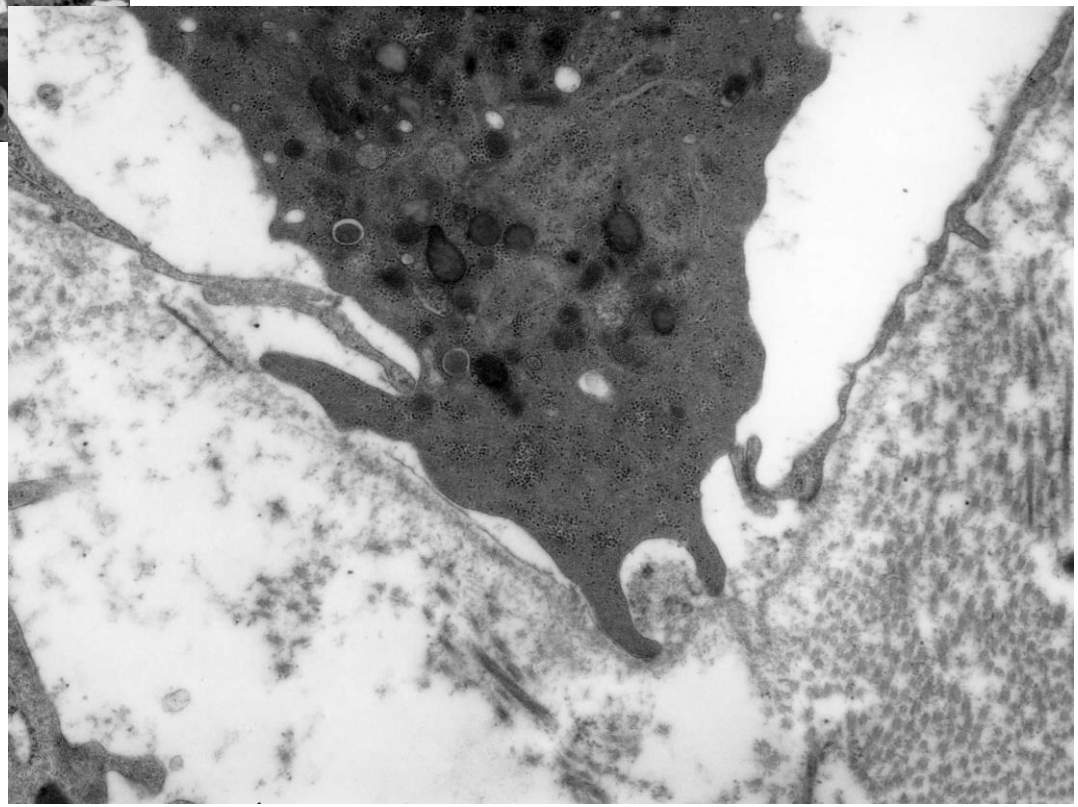
Pyelonephritis – renal interstitial capillary



Neutrophils and monocytes pavementing

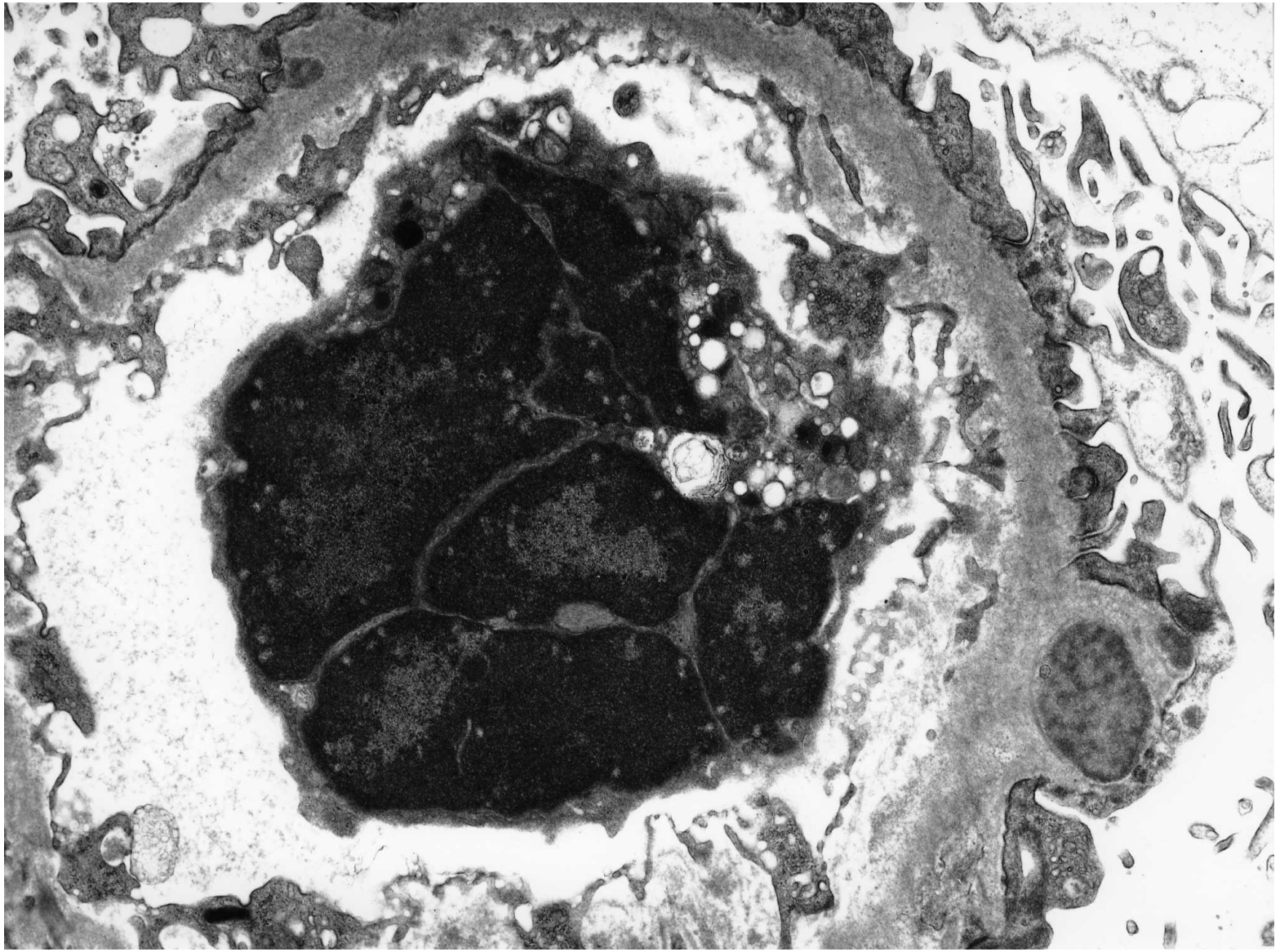


Pyelonephritis – interstitial capillary

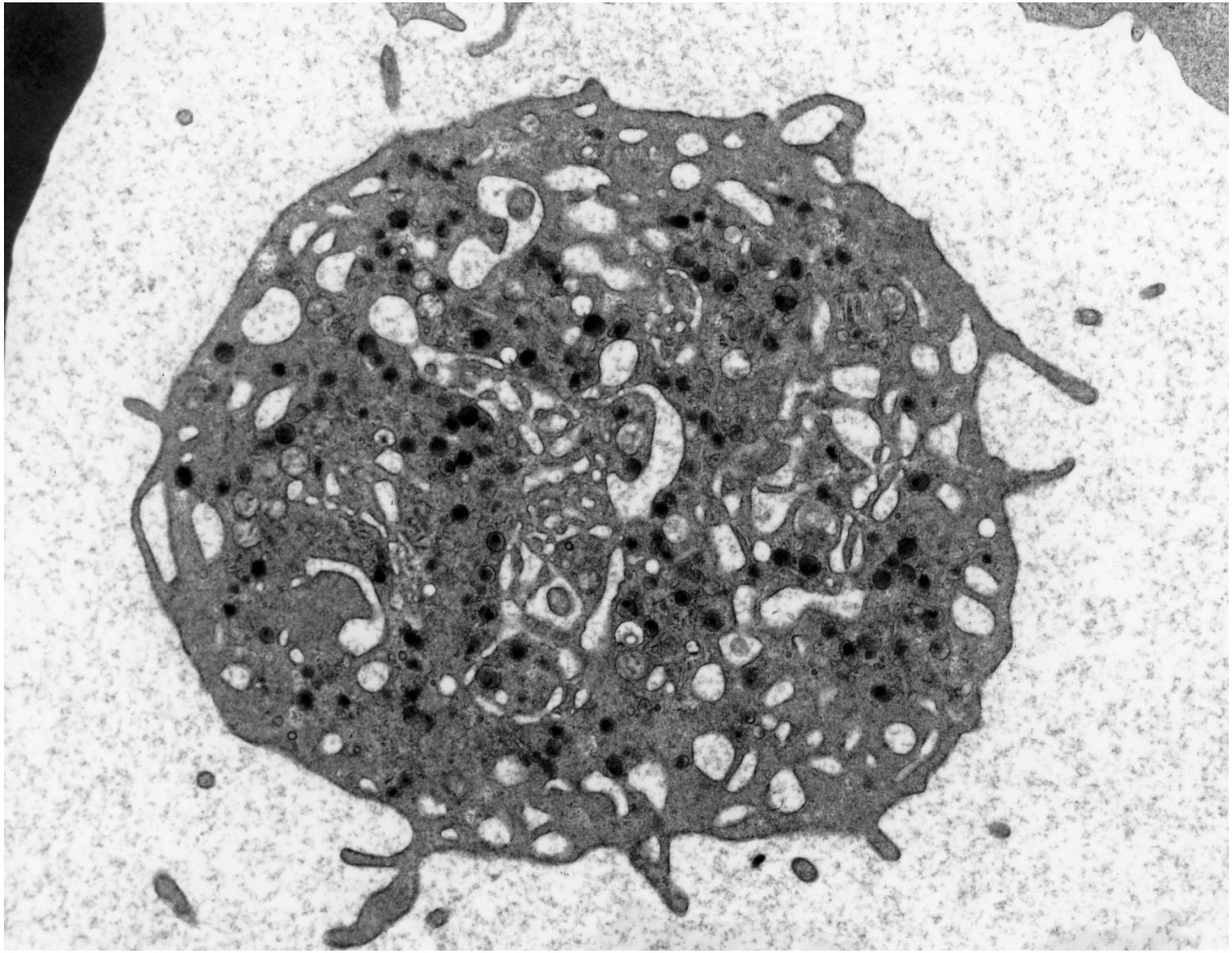


Neutrophil undergoing diapedesis

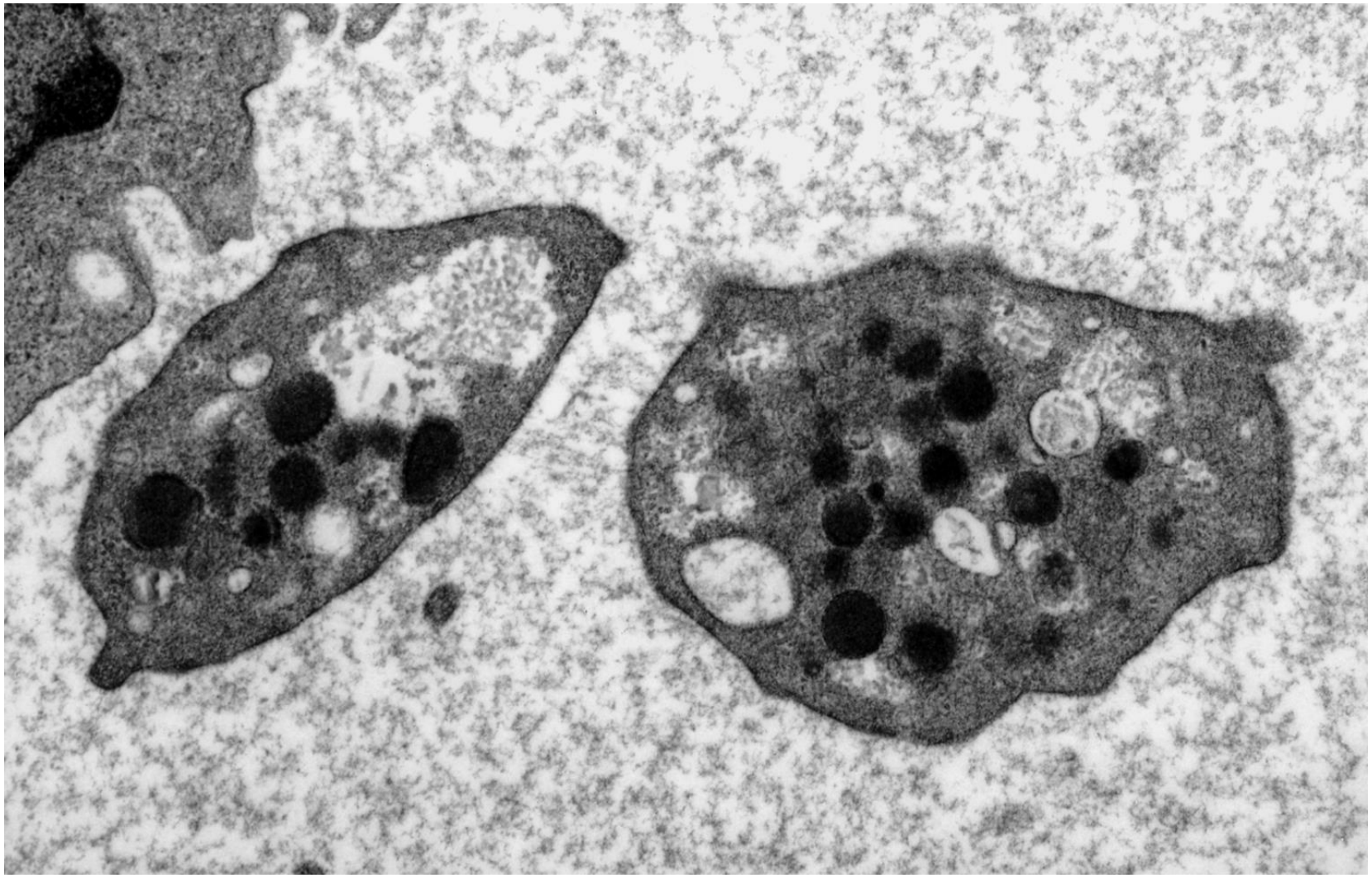
Circulating megakaryocyte naked nucleus



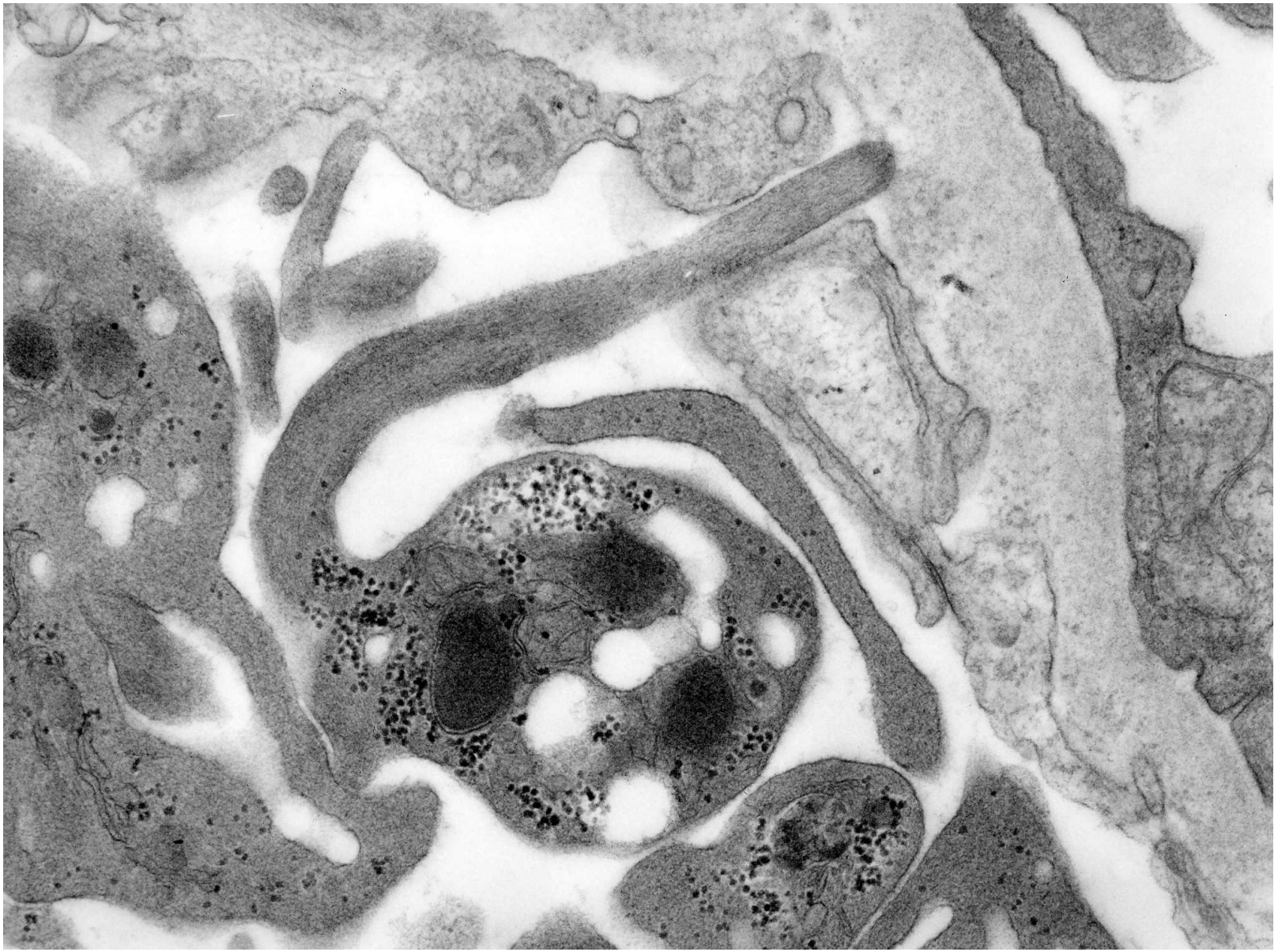
Circulating larger platelet



Circulating platelets



Platelet pseudopodium adherent to GBM



Scanning electron microscopy of fibrin and erythrocytes

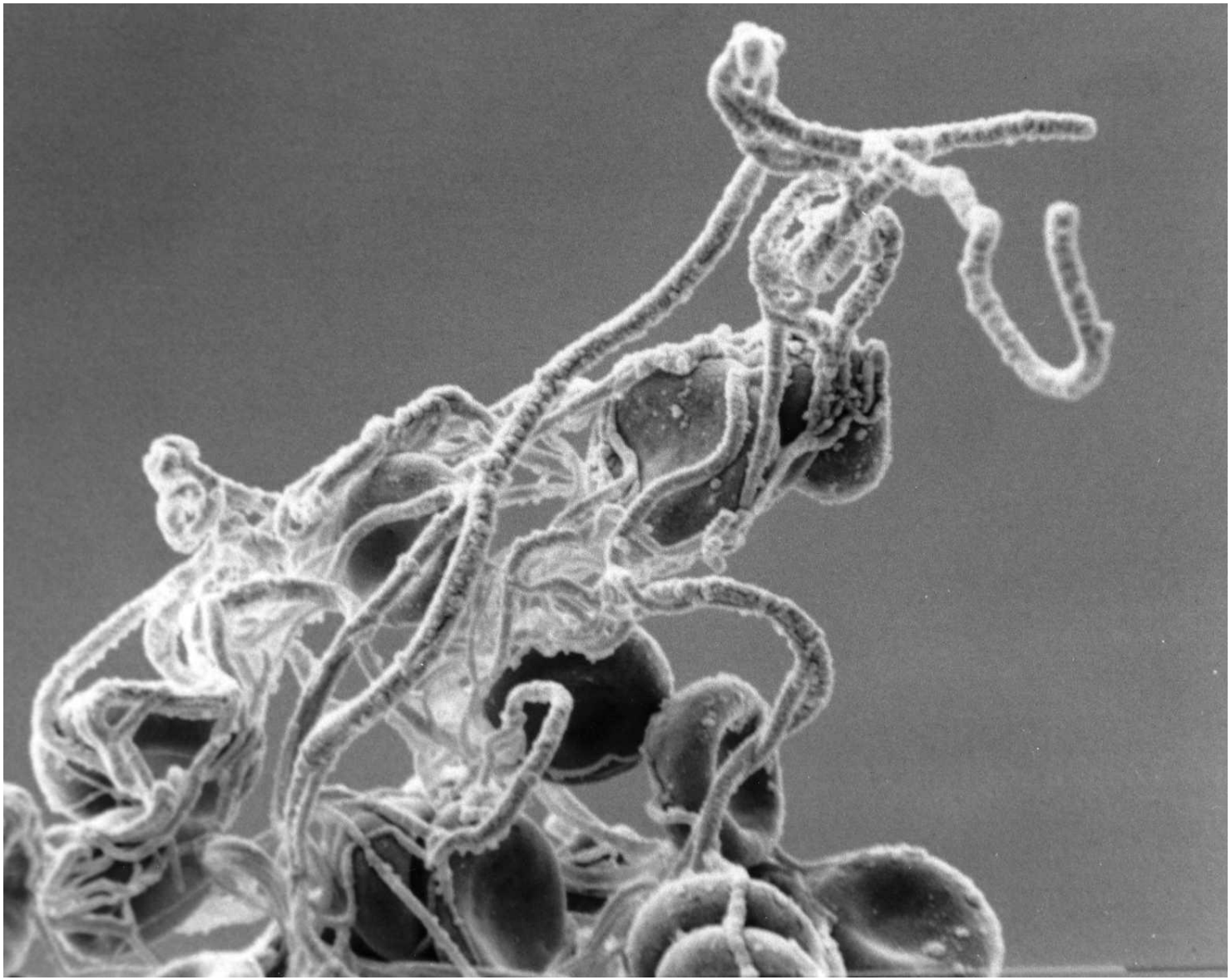


Image courtesy of Mick Faulkner, Sheffield University