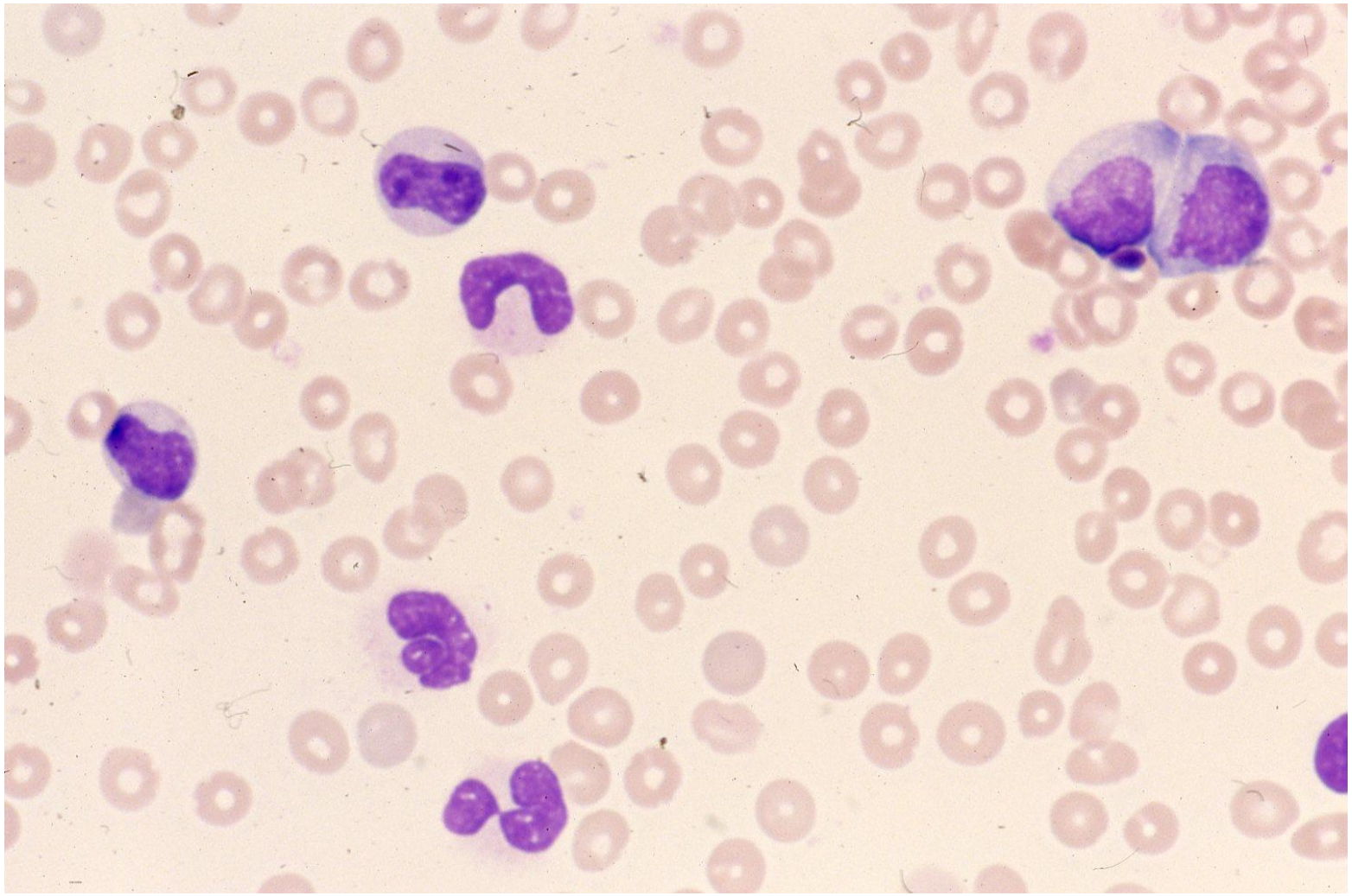
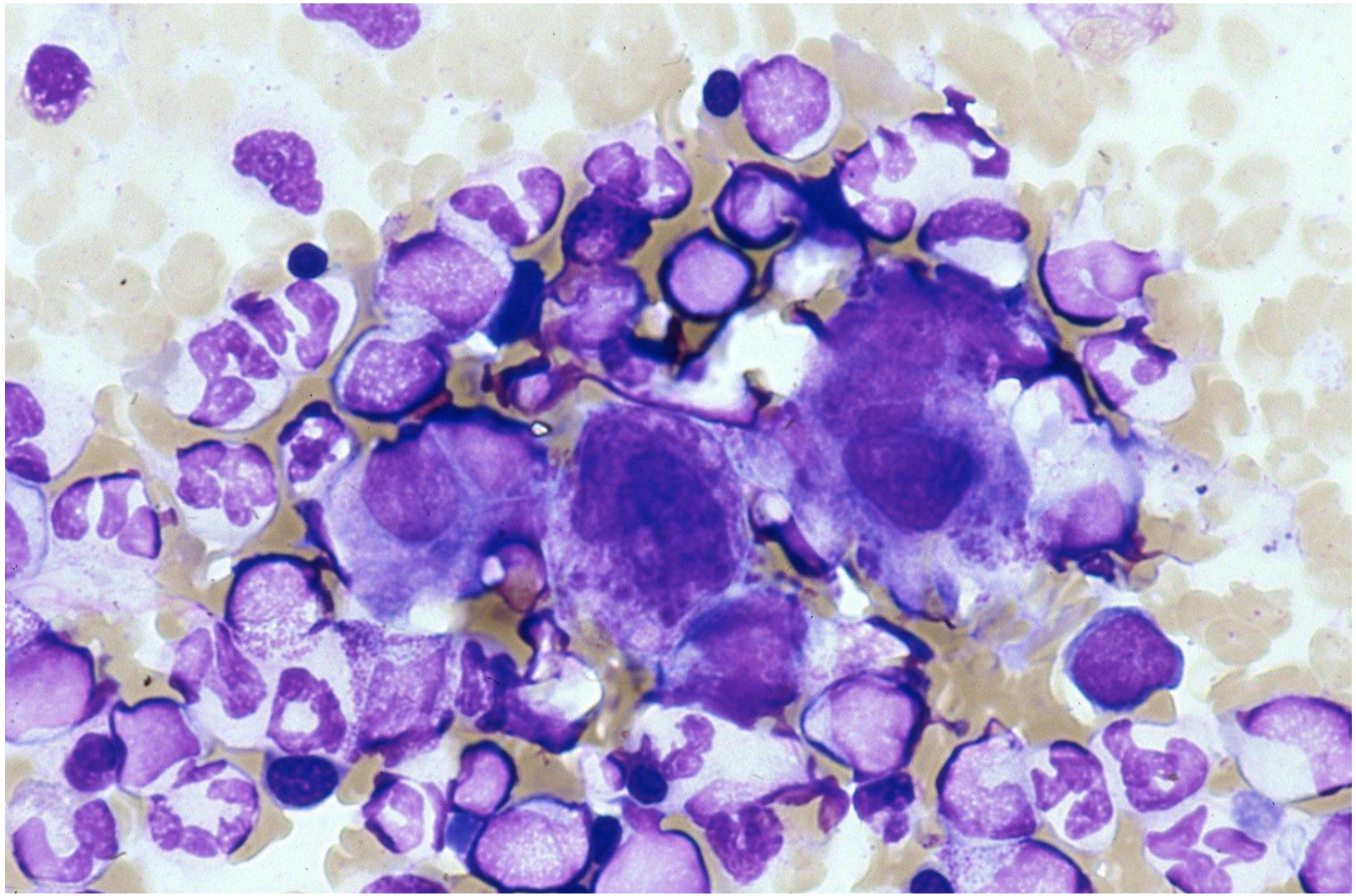
Myeloproliferative disorders in May-Giemsa smears and HE preparations

Myeloproliferative disorders (myeloproliferative neoplasms) include chronic myeloid leukemia (CML), polycythemia vera, essential thrombocythemia and primary myelofibrosis. Peripheral blood features are different, but the bone marrow histology is common among these disorders: hypercellular marrow with increase of megakaryocytes and reticulin fibrosis. The marrow is often dry tapped. Splenomegaly is especially prominent in CML and primary myelofibrosis.

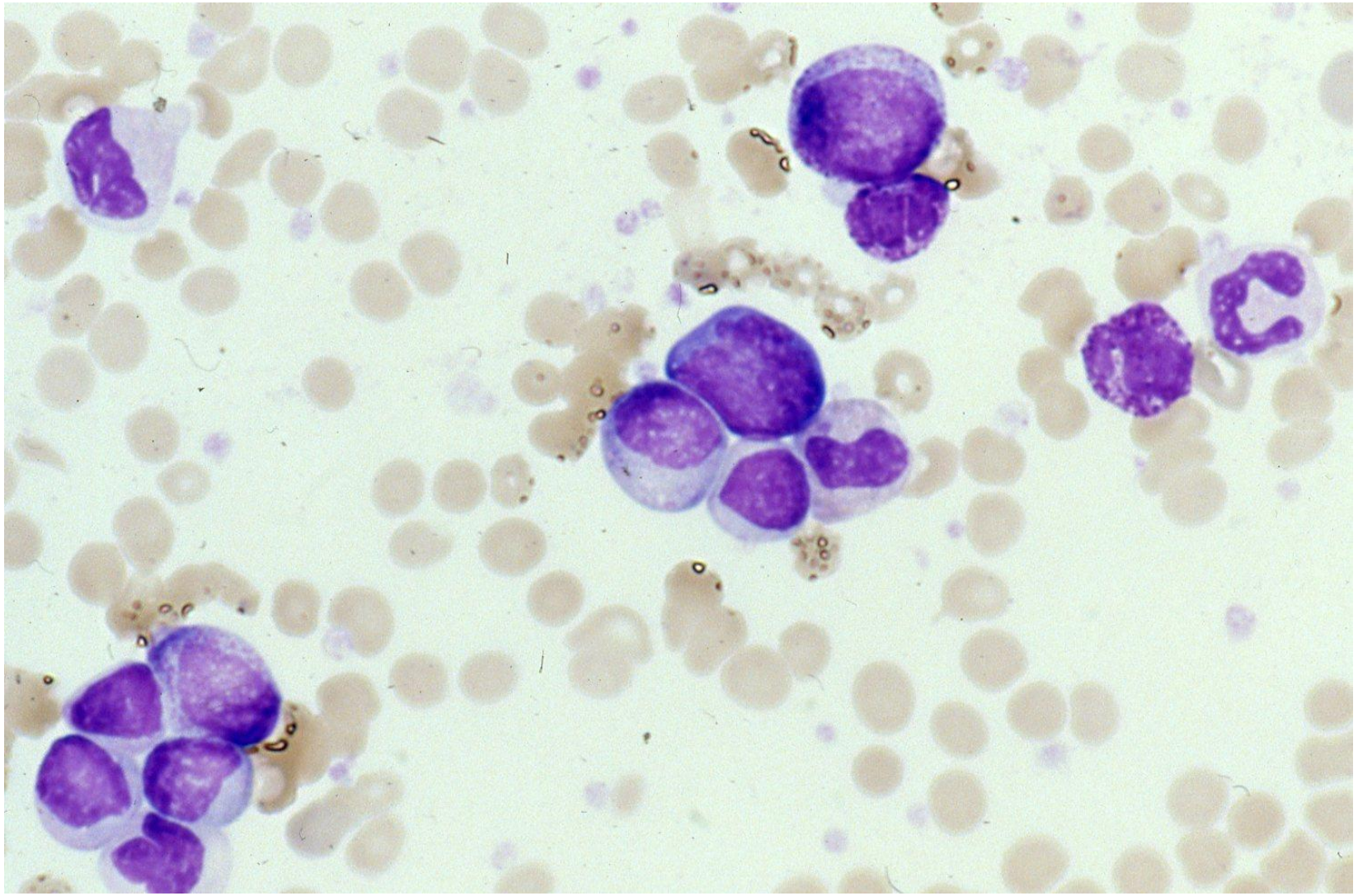
Ref.: Spivak JL. Myeloproliferative neoplasms. N Engl J Med 2017; 376: 2168-2181. doi: 10.1056/NEJMra1406186



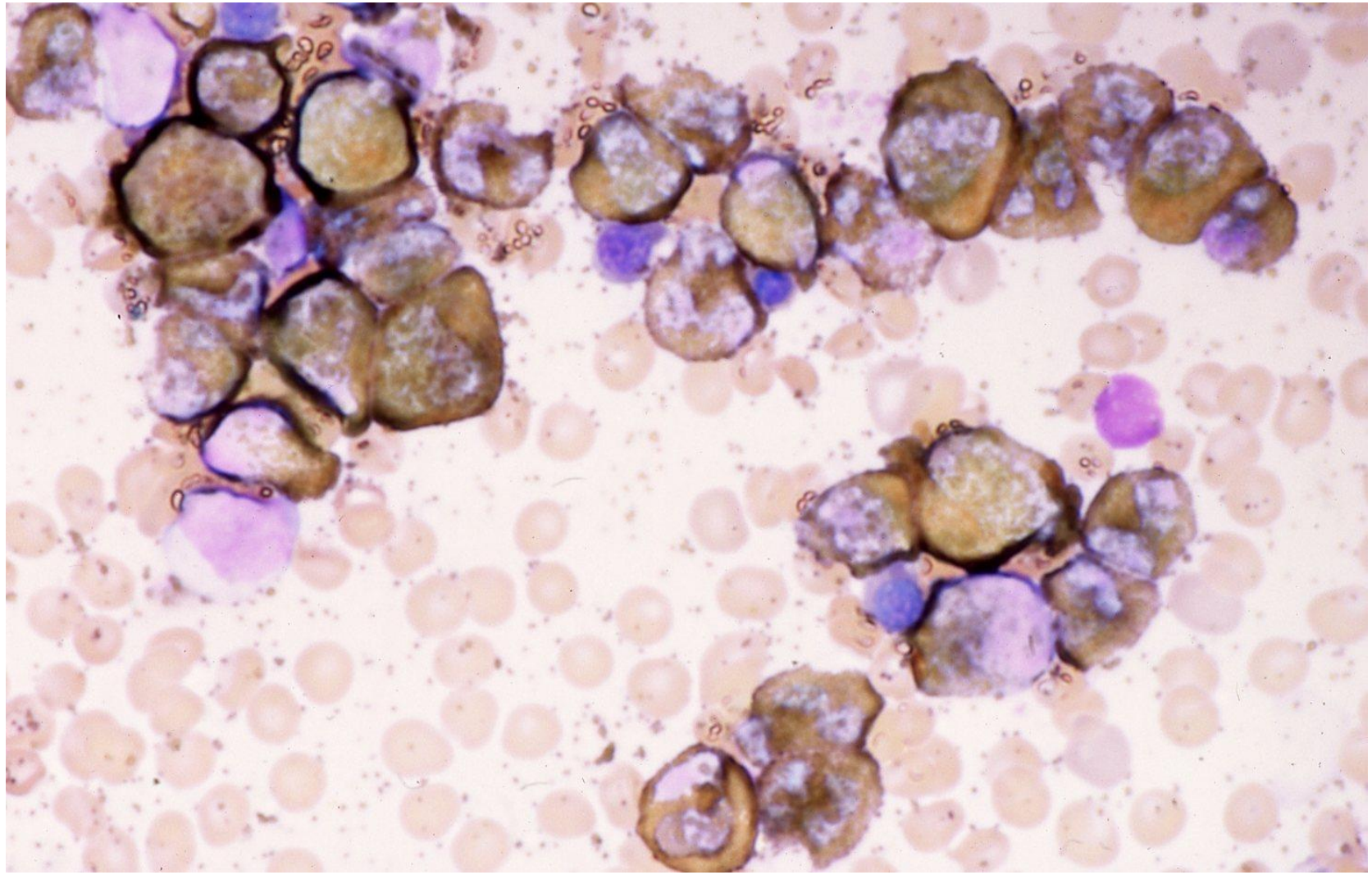
Chronic myeloid leukemia. May-Giemsa-stained peripheral blood smear. Increase of leukocytes is evident. Mature and maturing granulocytes (from myelocytes to segmented forms) are seen. The leukocyte count is 450,000/μL.



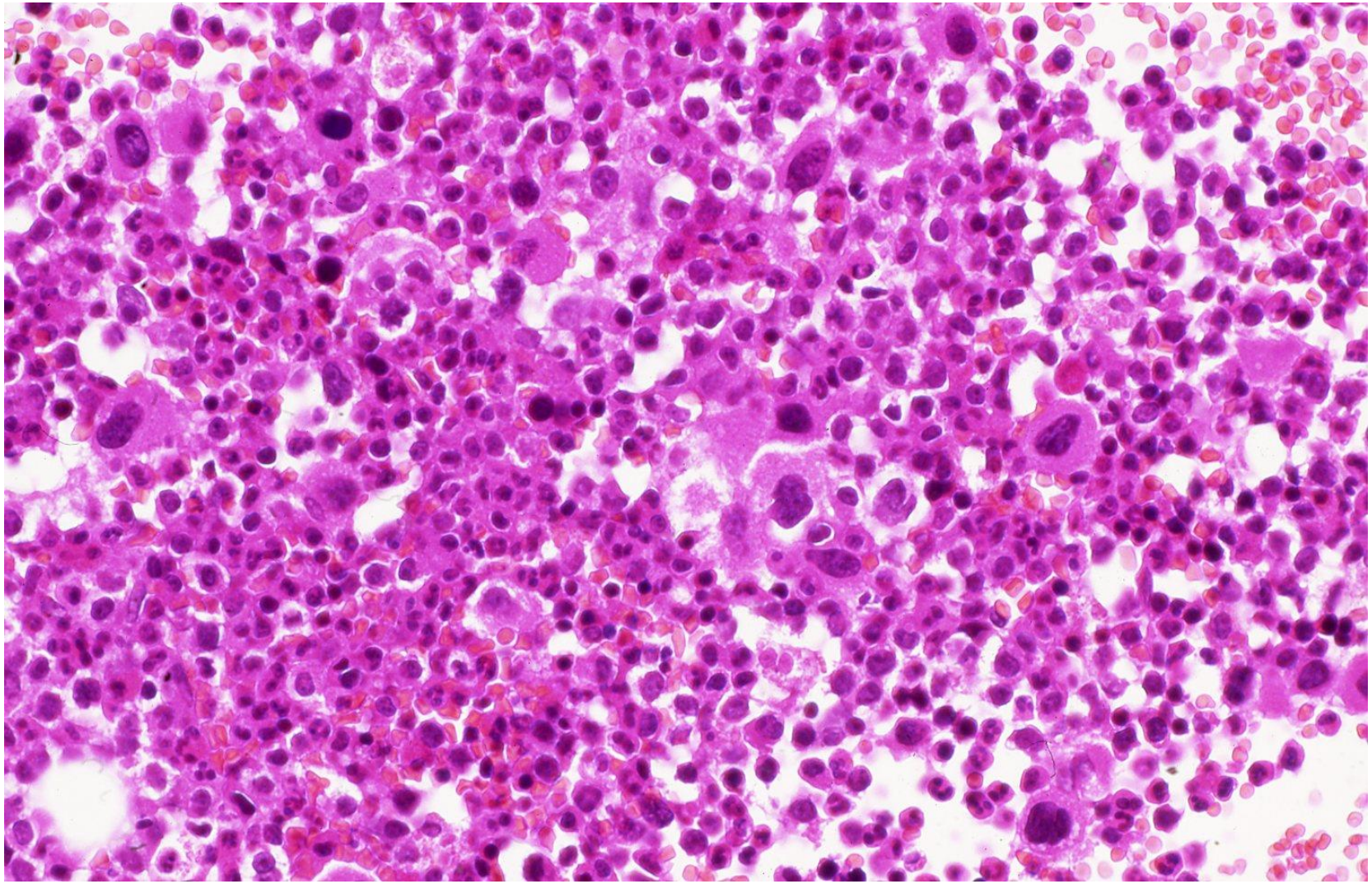
Chronic myeloid leukemia. May-Giemsa-stained bone marrow smear. Increase of leukocytes and immature-looking megakaryocytes is evident. Mature and maturing granulocytes (from myeloblasts to segmented forms) are seen. Erythroid series is markedly suppressed. The leukocyte count is 660,000/μL.



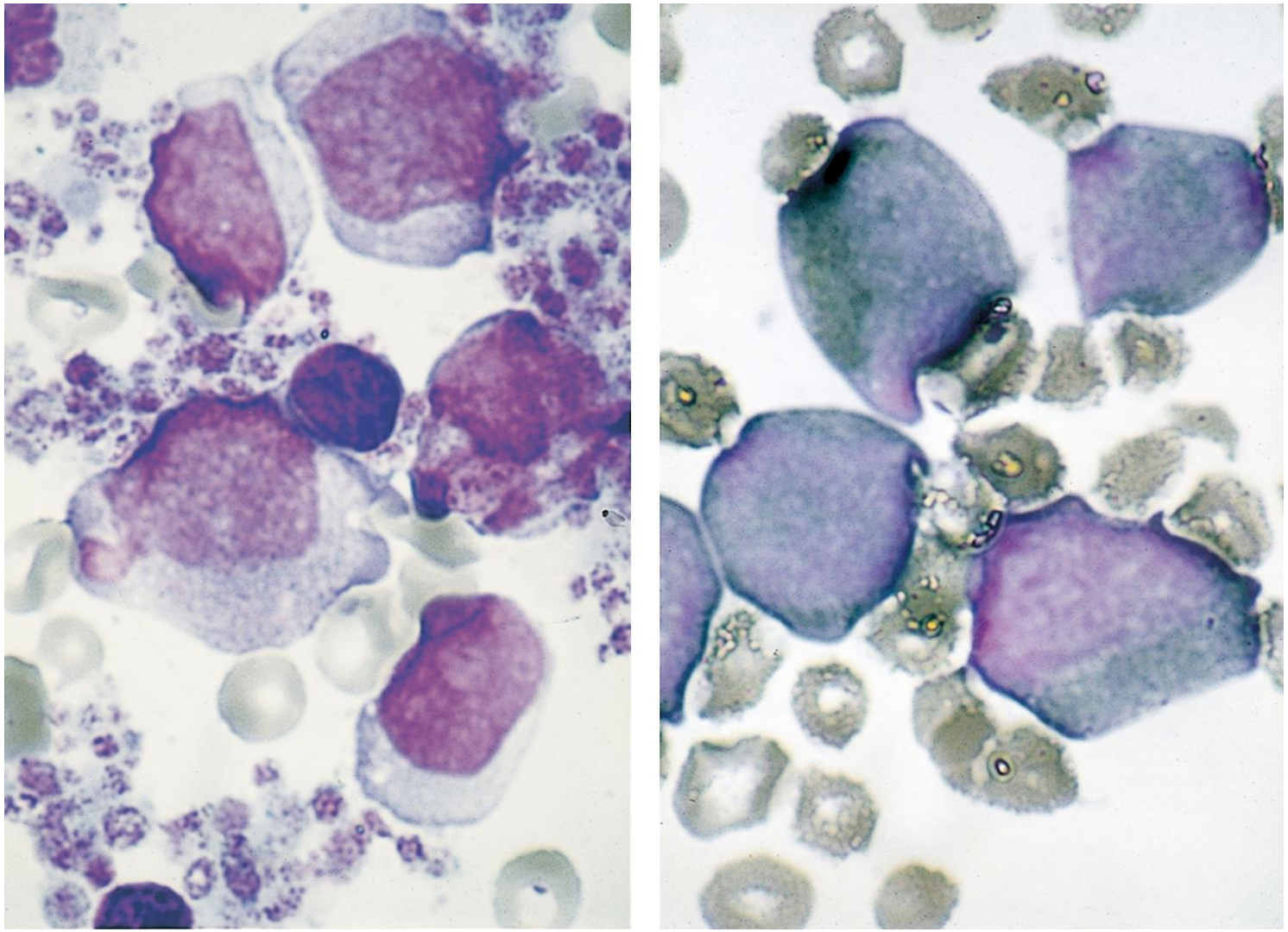
Chronic myeloid leukemia. May-Giemsa-stained bone marrow smear. Mature and maturing granulocytes (from myeloblasts to segmented forms) are seen. The leukocyte count is 660,000/μL.



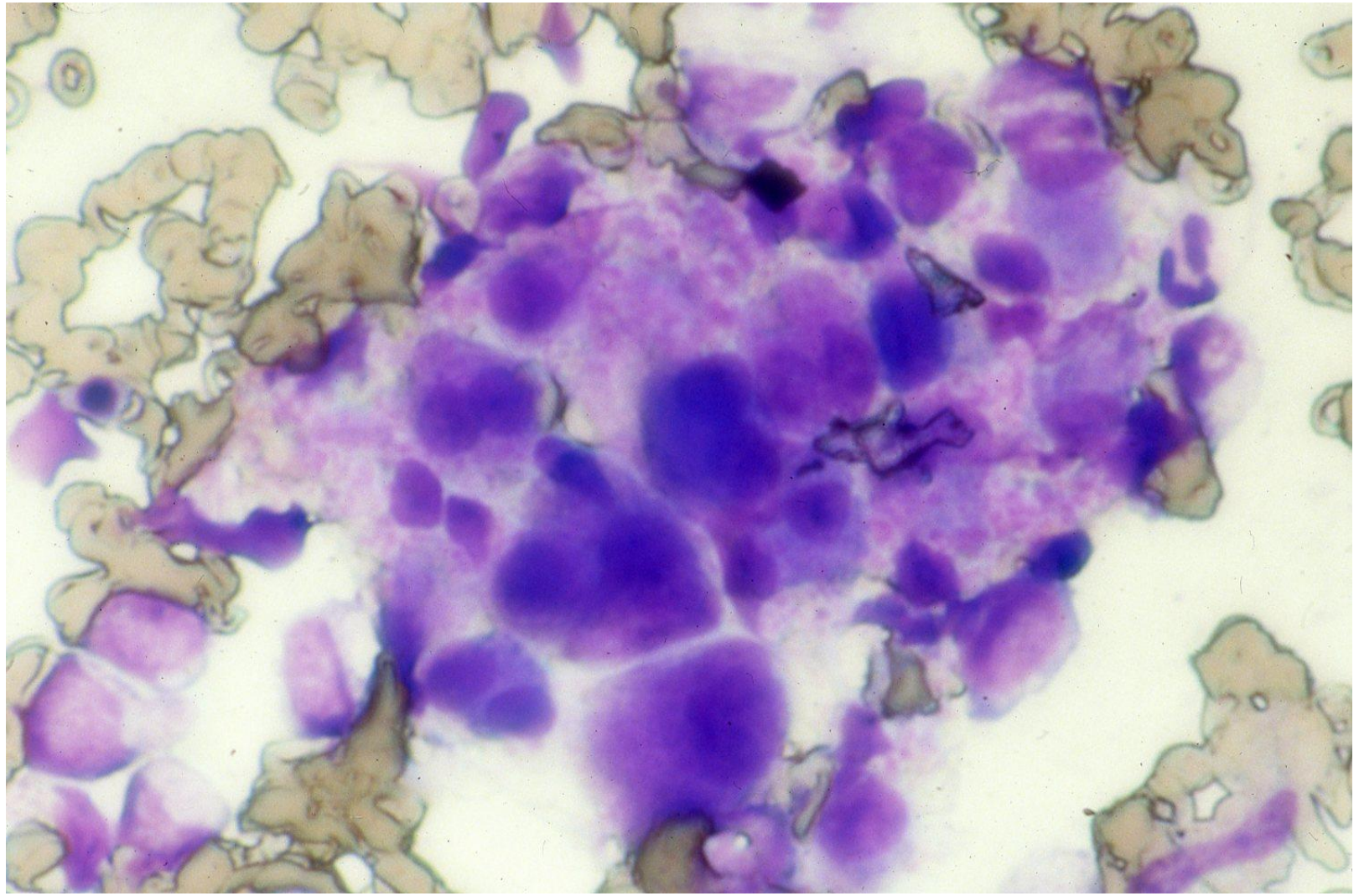
Chronic myeloid leukemia. Peroxidase-stained bone marrow smear.
Mature and maturing granulocytes are positive for peroxidase activity.



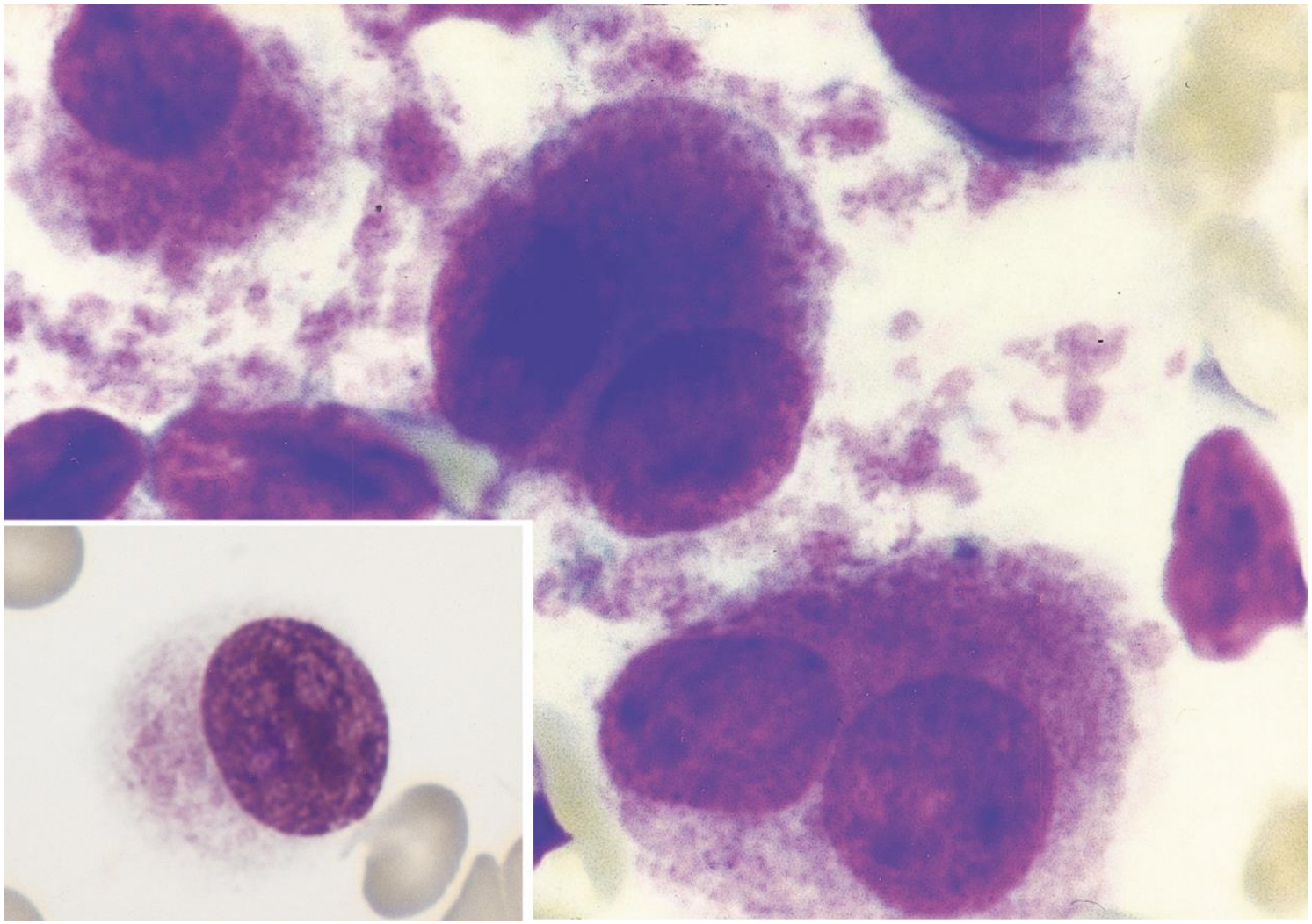
Chronic myeloid leukemia. H&E-stained bone marrow aspiration. In the markedly hypercellular marrow, granulocytes of mature and maturing forms and atypical megakaryocytes are seen. The leukocyte count is 660,000/μL.



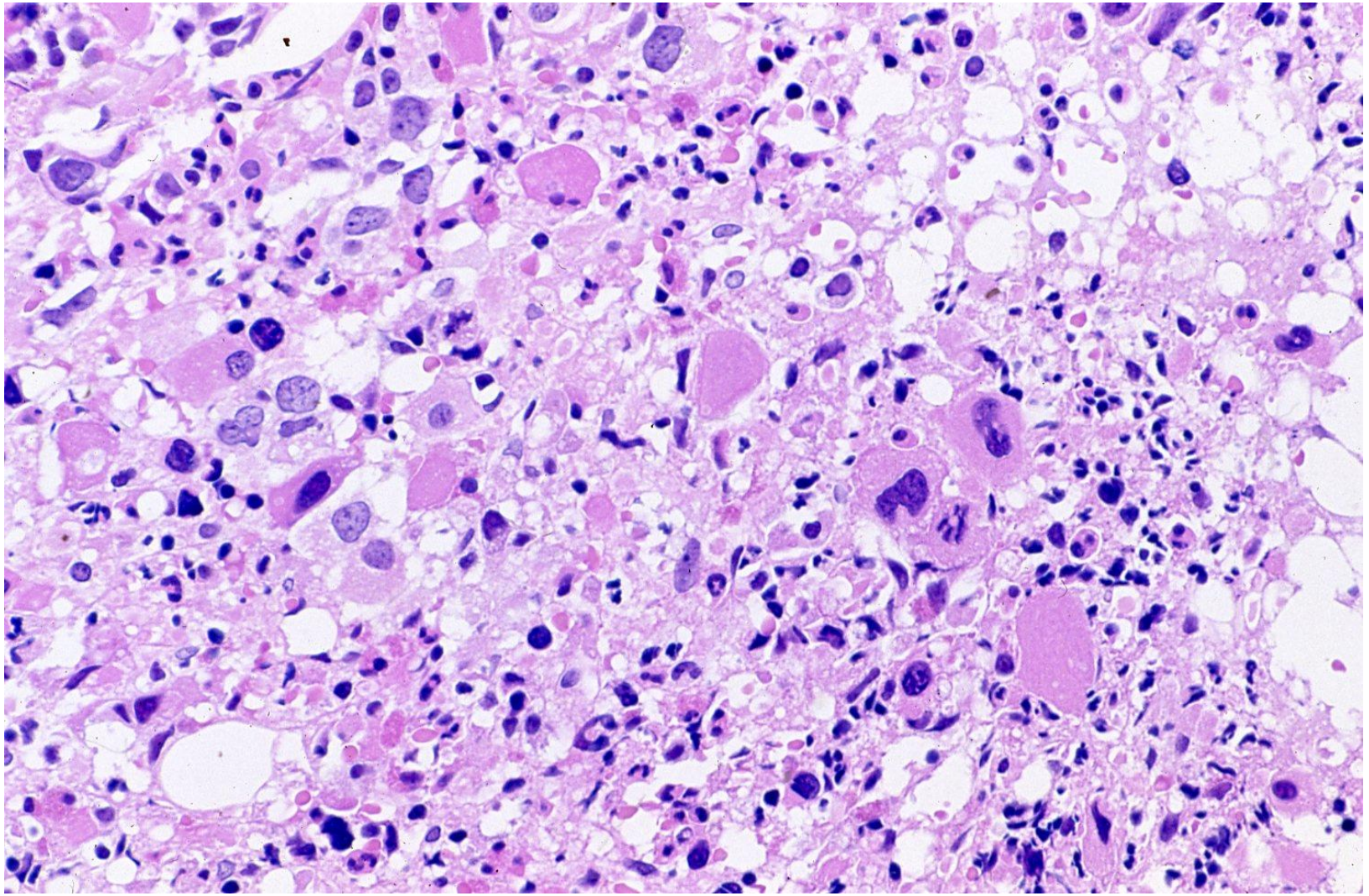
Myeloid blast crisis in chronic myeloid leukemia (bone marrow aspiration, left: May-Giemsa, right: peroxidase activity). This 42-year-old man was diagnosed as Ph1-positive CML, 3 years ago. He manifested with fever, severe malaise and progressive splenomegaly. Finely granulated blasts are positive for peroxidase activity. A high platelet number is characteristic of CML.



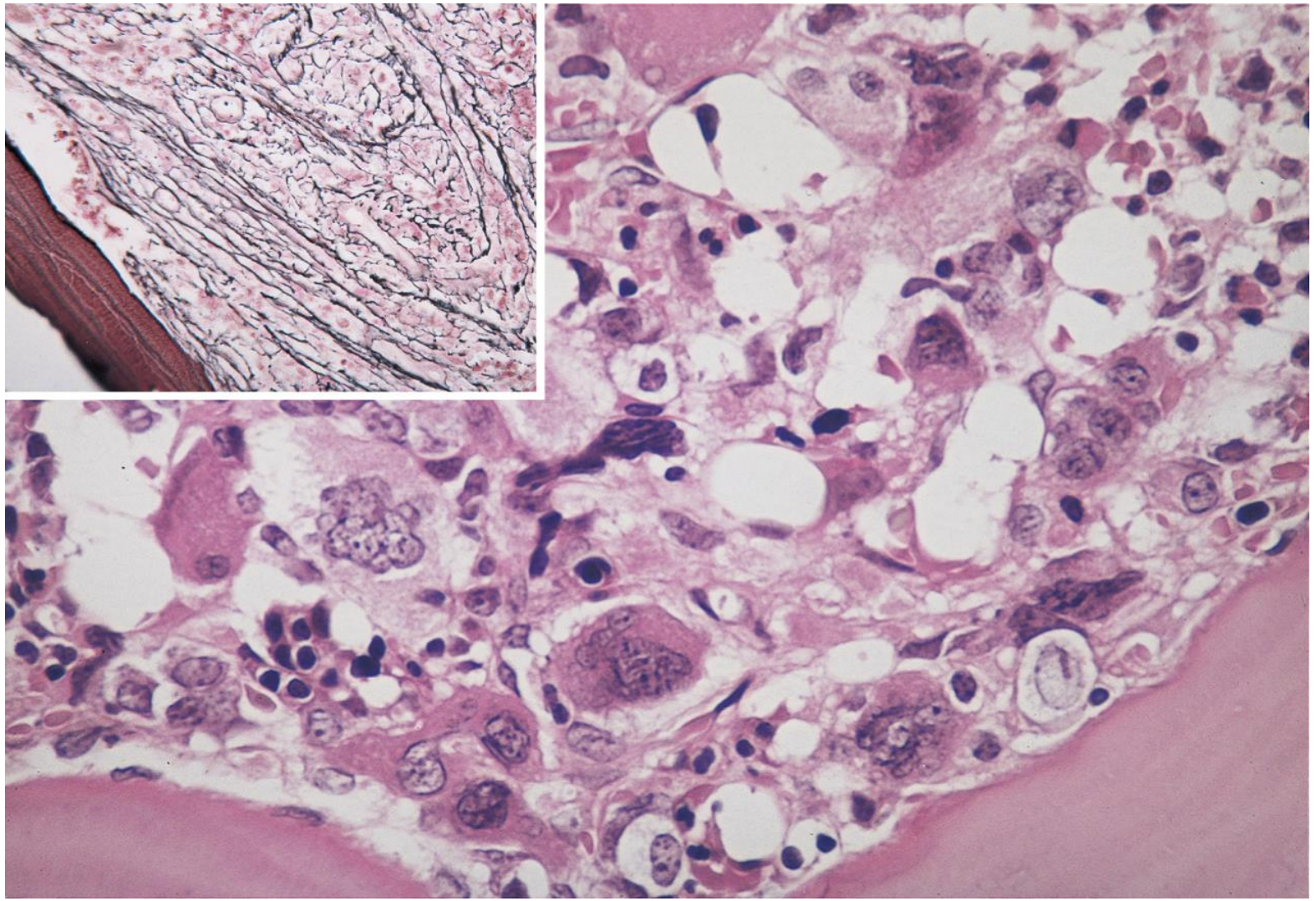
Megakaryoblastic crisis in chronic myeloid leukemia (bone marrow aspiration, May-Giemsa) (1). This 56-year-old man was diagnosed as Ph1-positive CML, 3 years ago. He presented with high fever and progressive increase of WBC and platelets in the peripheral blood. Megakaryoblasts are clustered in the marrow smear.



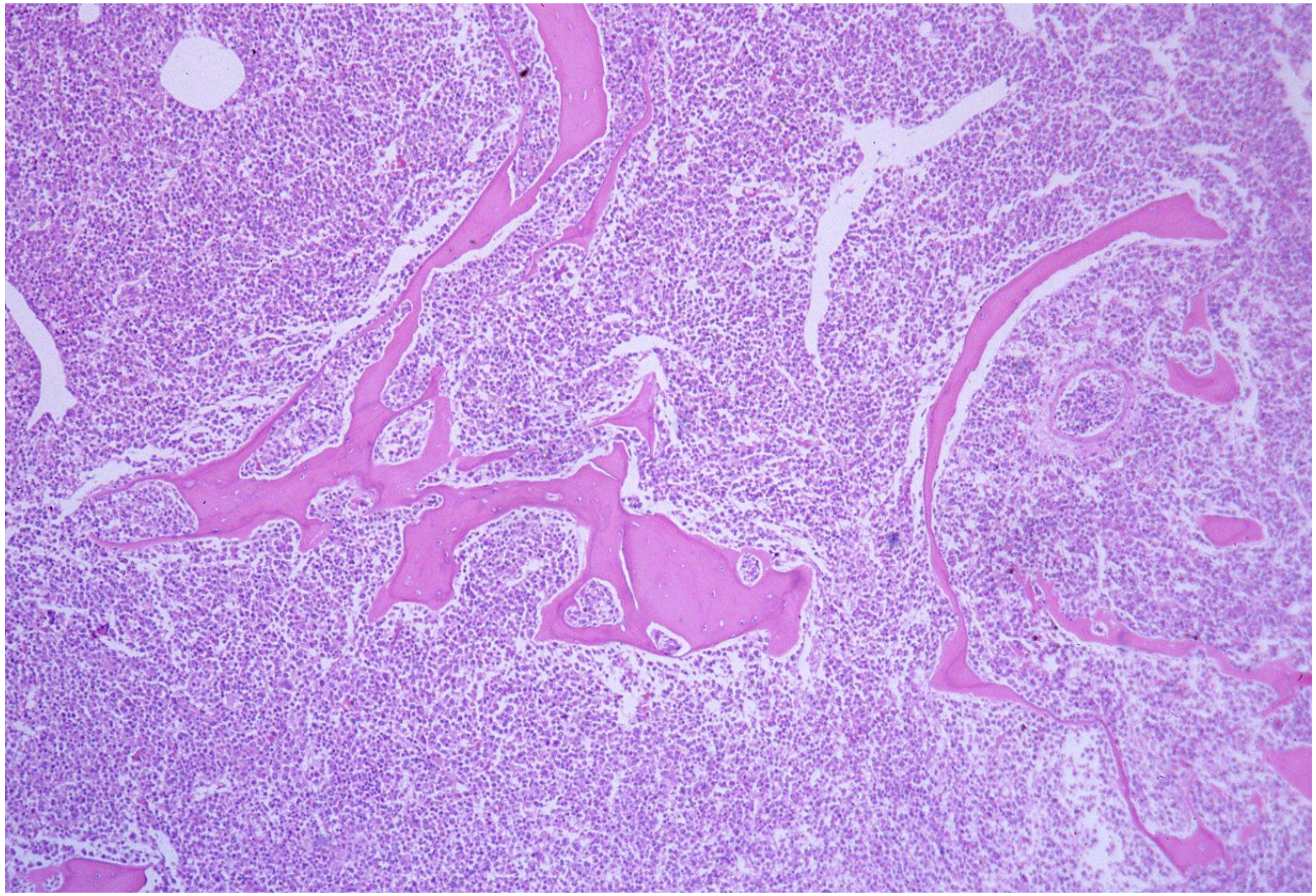
Megakaryoblastic crisis in chronic myeloid leukemia (bone marrow aspiration, inset: peripheral blood smear, May-Giemsa) (2). This 56-year-old man was diagnosed as Ph1-positive CML, 3 years ago. He presented with high fever and progressive increase of WBC and platelets in the peripheral blood. High-powered view of the megakaryoblasts in the marrow and a mononucleated megakaryoblast (inset) are shown.



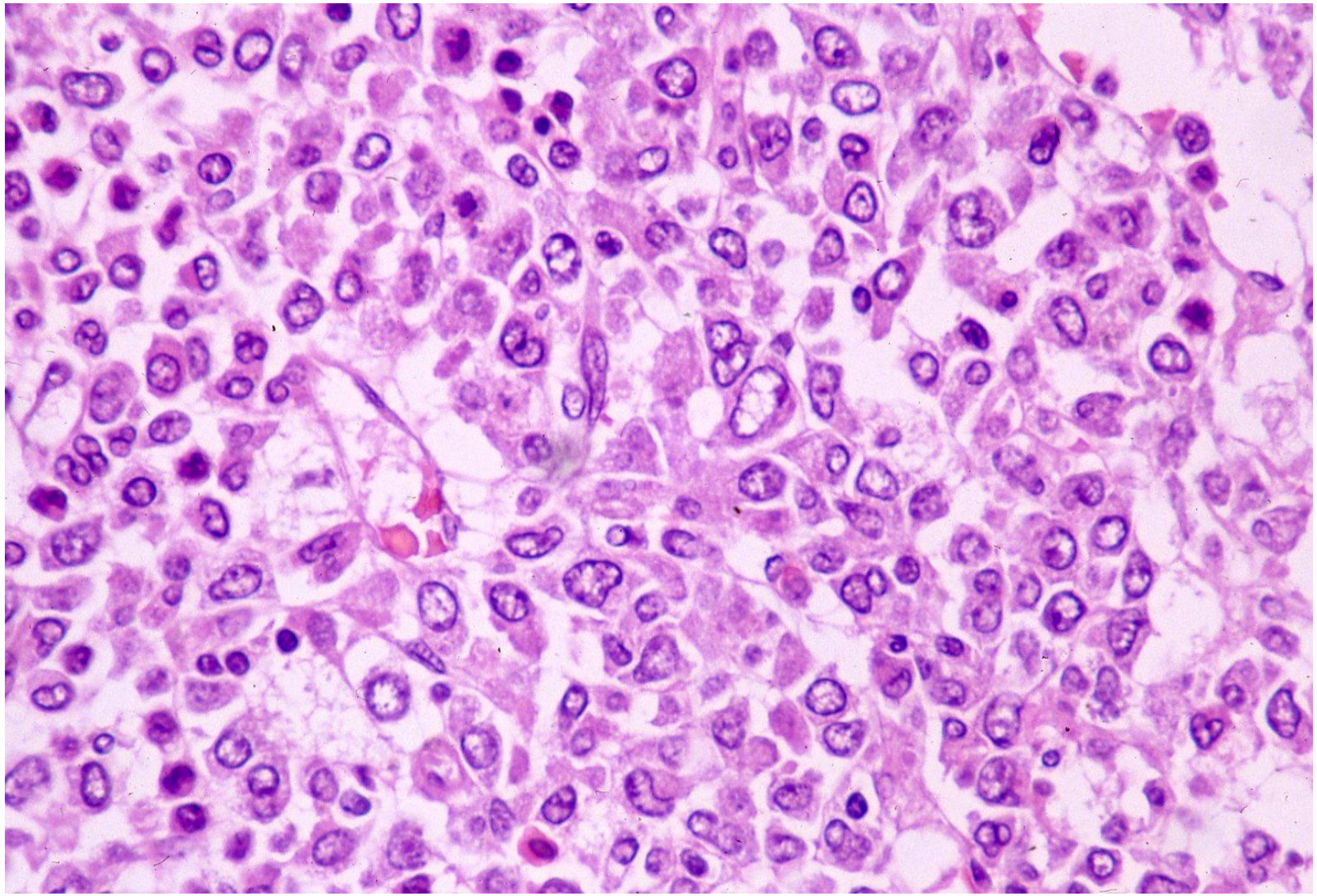
Essential thrombocythemia. Marked increase of platelets (1,100,000/mL) is pointed out in a 32-year-old man. The bone marrow was dry tapped, and needle biopsy of the bone marrow was performed. Marked increase of atypical megakaryocytes is seen in the background of reticulin fibrosis. The features are indistinguishable from chronic myeloid leukemia and primary myelofibrosis. H&E



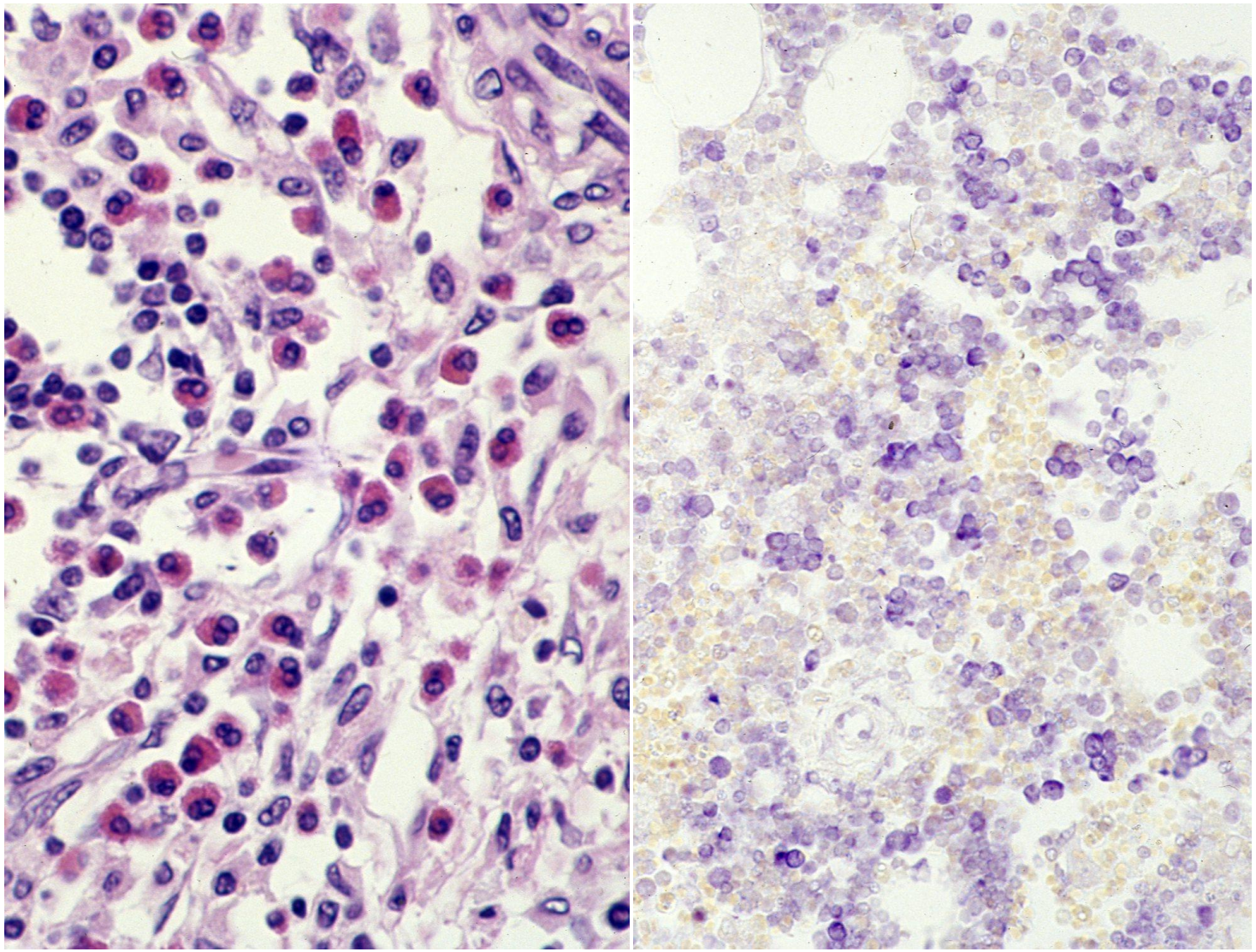
Primary myelofibrosis. A 25-year-old man presented with anemia and splenomegaly. RBC 2,500,000/μL with teardrop erythrocytes), WBC 7,400/μL with 8% erythroblasts and 1% blasts, and platelets 560,000/μL. Bone marrow aspiration was dry tapped, and then needle biopsy was performed (H&E). Atypical megakaryocytes grow in the marrow space with reticulin fibrosis (inset: silver impregnation).



Blast crisis in primary myelofibrosis (a 52-year-old woman) (1). At autopsy, the bone marrow is massively replaced by proliferating blasts. Osteosclerosis is reminiscent to the pre-existing myelofibrosis. H&E



Blast crisis in primary myelofibrosis (a 52-year-old woman) (2). At autopsy, the bone marrow is massively replaced by proliferating blasts. The blasts possess relatively wide granular cytoplasm and lobulated nuclei, indicating a myeloid crisis. H&E



Systemic mastocytosis. A 27-year-old man suddenly died of anaphylactic shock. At autopsy, in addition to urticaria pigmentosa in the skin, systemic infiltration of mast cells, including the bone marrow, is identified. The mast cells in the marrow space possess basophilic cytoplasm (left: H&E) and show metachromasia with toluidine blue (right: toluidine blue). Eosinophilic infiltration is closely associated.