the production of cytotoxic IgM antibodies to CD8+ T lymphocytes, antibodies to CD5+ T lymphocytes, and an increase in the ratio of CD4+ to CD8+ T cells. These events may lead to uninhibited B cell production of IgM and the formation of cryoglobulins (IgM aggregates and immune complexes). This immunologic process stimulates reticuloendothelial hyperplasia and clearance activity and eventually produces splenomegaly. Patients with hyperreactive malarial splenomegaly present with an abdominal mass or a dragging sensation in the abdomen and occasional sharp abdominal pains suggesting perisplenitis. Anemia and some degree of pancytopenia are usually evident, and in some cases malarial parasites cannot be found in peripheral-blood smears. Vulnerability to respiratory and skin infections is increased; many patients die of overwhelming sepsis. Persons with hyperreactive malarial splenomegaly who are living in endemic areas should receive antimalarial chemoprophylaxis; the results are usually good. In nonendemic areas, antimalarial treatment is advised. In some cases refractory to therapy, clonal lymphoproliferation may develop and can then evolve into a malignant lymphoproliferative disorder.

QUARTAN MALARIAL NEPHROPATHY

Chronic or repeated infections with *P. malariae* (and possibly with other malarial species) may cause soluble immune complex injury to the renal glomeruli, resulting in the nephrotic syndrome. Other unidentified factors must contribute to this process since only a very small proportion of infected patients develop renal disease. The histologic appearance is that of focal or segmental glomerulonephritis with splitting of the capillary basement membrane. Subendothelial dense deposits are seen on electron microscopy, and immunofluorescence reveals deposits of complement and immunoglobulins; in samples of renal tissue from children, *P. malariae* antigens are often visible. A coarse-granular pattern of basement membrane immunofluorescent deposits (predominantly IgG3) with selective proteinuria carries a better prognosis than a fine-granular, predominantly IgG2 pattern with nonselective proteinuria. Quartan nephropathy usually responds poorly to treatment with either antimalarial agents or glucocorticoids and cytotoxic drugs.

BURKITT'S LYMPHOMA AND EPSTEIN-BARR VIRUS INFECTION

It is possible that malaria-related immune dysregulation provokes infection with lymphoma viruses. Burkitt's lymphoma is strongly associated with Epstein-Barr virus. The prevalence of this childhood tumor is high in malarious areas of Africa.

DIAGNOSIS

DEMONSTRATION OF THE PARASITE

The diagnosis of malaria rests on the demonstration of asexual forms of the parasite in stained peripheral-blood smears. After a negative blood smear, repeat smears should be made if there is a high degree of suspicion. Of the Romanowsky stains, Giemsa at pH 7.2 is preferred; Field's, Wright's, or Leishman's stain can also be used. Both thin **(Figs. 248-4 and 248-5; see also Figs. 250e-3 and 250e-4)** and thick **(Figs. 248-6, 248-7, 248-8, and 248-9)** blood smears should be examined. The thin blood smear should be rapidly air-dried, fixed in anhydrous methanol, and stained; the RBCs in the tail of the film should then be examined under oil immersion (×1000 magnification). The level of parasitemia is expressed as the number of parasitized erythrocytes per 1000 RBCs. The thick blood film should be of uneven thickness. The smear should be dried thoroughly and stained without fixing. As many layers of erythrocytes overlie one another and are lysed during the staining procedure, the thick film has the advantage of concentrating the parasites (by 40- to 100-fold compared with a thin blood film) and thus increasing diagnostic sensitivity. Both parasites and white blood cells (WBCs) are counted, and the number of parasites per unit volume is calculated from the total leukocyte count. Alternatively, a WBC count of 8000/μL is assumed. This figure is converted to the number of parasitized erythrocytes per microliter. A minimum of 200 WBCs should be counted under oil immersion. Interpretation of blood smear films requires some experience because artifacts are common. Before a thick smear is judged to be negative, 100–200 fields should be examined under oil immersion. In high-transmission areas, the presence of up to 10,000 parasites/μL of blood may be tolerated without symptoms or signs in partially immune individuals. Thus in these areas the detection of malaria parasites is sensitive but has low specificity in identifying

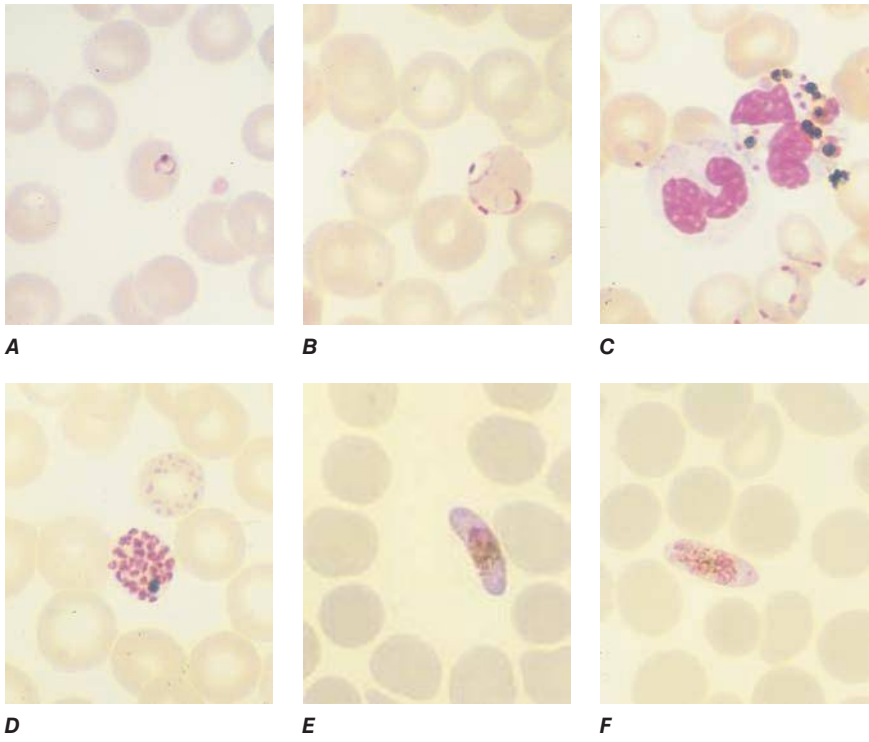

FIGURE 248-4 **Thin blood films of *Plasmodium falciparum*. *A.*** Young trophozoites. ***B.*** Old trophozoites. ***C.*** Pigment in polymorphonuclear cells and trophozoites. ***D.*** Mature schizonts. ***E.*** Female gametocytes. ***F.*** Male gametocytes. *(Reproduced from Bench Aids for the Diagnosis of Malaria Infections, 2nd ed, with the permission of the World Health Organization.)*