

TABLE 245e-1 FLATWORM INFECTIONS

Parasite	Geographic Distribution	Life-Cycle Hosts		Diagnosis			
		Intermediate (Transmission)	Definitive	Parasite Stage	Body Fluid or Tissue	Serologic Tests	Other
<b>Tapeworms (Cestodes)</b>							
Intestinal tapeworms							
<i>Taenia saginata</i> (beef tapeworm)	Worldwide	Beef	Humans	Ova, segments	Feces	—	Motile segments
<i>Hymenolepis nana</i> (dwarf tapeworm)	Worldwide	Grain beetles	Humans, mice <sup>a</sup>	Ova	Feces	—	—
<i>Diphyllobothrium latum</i> (fish tapeworm)	Worldwide	Copepods–fish <sup>b</sup>	Humans, other mammals	Ova, segments	Feces	—	Megaloblastic anemia in 1%
<i>T. solium</i> <sup>c</sup> (pork tapeworm)	Worldwide	Swine	Humans	Ova, segments	Feces	WB	Especially Mexico, Central and South America, Africa
Somatic tapeworms							
<i>Echinococcus granulosus</i> (hydatid disease)	Sheep-raising and hunting areas	Sheep, camels, humans, others	Dogs	Hydatid	Lung, liver	WB, EIA	Chest radiography, CT, MRI
<i>E. multilocularis</i> (hydatid disease)	Subarctic areas	Rodents, humans	Foxes, dogs, cats	Hydatid	Liver	—	May resemble cholangiocellular carcinoma
<i>T. solium</i> <sup>c</sup> (pork tapeworm)	Worldwide	Swine, humans	Humans	Cysticercus	Muscles, CNS	WB	CT, MRI, radiography
<b>Flukes (Trematodes)</b>							
Intestinal flukes							
<i>Fasciolopsis buski</i>	China, India	Snails–water chestnuts	Humans	Ova	Feces	—	—
<i>Heterophyes heterophyes</i>	Far East, India	Snails–fish	Humans	Ova	Feces	—	—
<i>Metagonimus yokogawai</i>	Far East, Balkans, North Africa	Snails–fish	Humans	Ova	Feces	—	—
Liver flukes							
<i>Clonorchis sinensis</i>	China, Southeast Asia	Snails–fish	Humans	Ova	Feces, bile	—	Recurrent bacterial cholangitis
<i>Fasciola hepatica</i>	Sheep-raising areas	Snails–watercress	Humans, sheep	Ova	Feces, <sup>d</sup> bile	EIA	Cirrhosis, portal hypertension
Lung flukes							
<i>Paragonimus</i> spp.	Orient, Africa, the Americas	Snails–crabs/crayfish	Humans, other mammals	Adults, ova	Lung, sputum, feces	WB, EIA	Chest radiography, CT, MRI
Blood flukes							
<i>Schistosoma mansoni</i>	Africa, Central and South America, West Indies	Snails	Humans	Ova, adults	Feces	EIA, WB	Rectal snips, liver biopsy
<i>S. haematobium</i>	Africa	Snails	Humans	Ova, adults	Urine	WB	Liver, urine, or bladder biopsy
<i>S. japonicum</i>	Far East	Snails	Humans	Ova, adults	Feces	WB	Liver biopsy

<sup>a</sup>Larvae also can mature in intestinal villi of humans and mice. <sup>b</sup>When there are two intermediate hosts, the first is separated from the second by a dash. Definitive hosts are infected by the second intermediate host. <sup>c</sup>*T. solium* can cause either intestinal infections or cysticercosis. Its ova are identical to those of *T. saginata*; scolices and segments of the two species differ. <sup>d</sup>Ova seldom reach the fecal stream during acute disease.

**Note:** CNS, central nervous system; EIA, enzyme immunoassay; WB, western blot. Serologic tests listed in Tables 245e-1, 245e-2, and 245e-3 are available commercially or from the Centers for Disease Control and Prevention, Atlanta, GA.

but microfilarial worms and blood protozoa are more easily visualized with Giemsa or Wright's staining.

The parasites most commonly detected in Giemsa-stained blood smears are the plasmodia, microfilariae, and African trypanosomes (Table 245e-5). Most patients with Chagas' disease present in the chronic phase, when *Trypanosoma cruzi* is no longer microscopically detectable in blood smears. Wet mounts are sometimes more sensitive than stained smears for the detection of microfilariae and African trypanosomes because these active parasites cause noticeable movement of the erythrocytes in the microscopic field. Filtration of blood through

a polycarbonate filter (pore size, 3–5 μm) facilitates the detection of microfilariae. The intracellular amastigote forms of *Leishmania* species and *T. cruzi* can sometimes be visualized in stained smears of peripheral blood, but aspirates of the bone marrow, liver, and spleen are the best sources for microscopic detection and culture of *Leishmania* in kala-azar and of *T. cruzi* in chronic Chagas' disease. The diagnosis of malaria and the critical distinction among the various *Plasmodium* species are made by microscopic examination of stained thick and thin blood films (Chap. 248). Because the lab infrastructure and technical expertise may not be available in many rural areas with high levels of