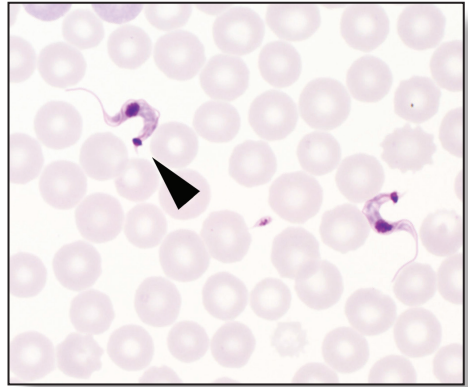
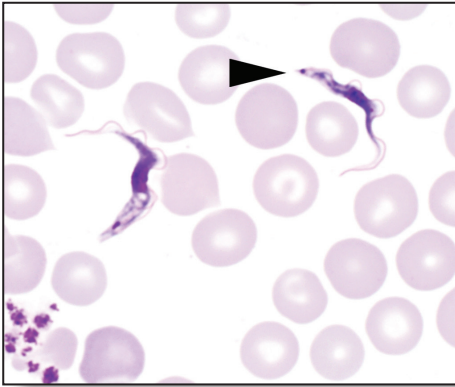


Trypanosomes: *Trypanosoma brucei* and *Trypanosoma cruzi*



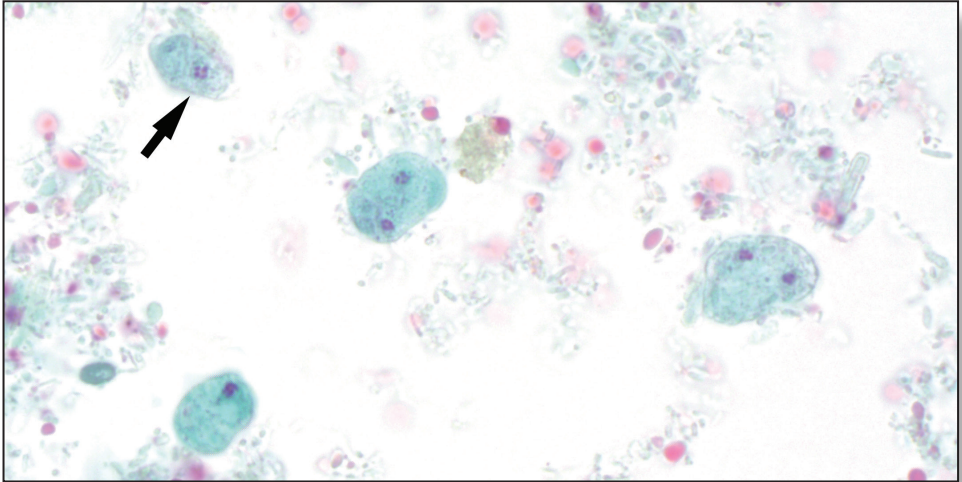
Microscopic Morphology: Trypanosomes are seen in peripheral blood as extracellular flagellated protozoa called trypomastigotes. Trypomastigotes of *Trypanosoma cruzi* (above right) are 12–30 μm in length while *T. brucei* trypomastigotes are 14–33 μm (above left). Both have a posterior kinetoplast (arrowheads), which is the most reliable feature for differentiating the two species; the kinetoplast is notably larger in *T. cruzi* than *T. brucei*. A flagellum arises from the kinetoplast and travels along the body as an undulating membrane, extending anteriorly as a free flagellum. *T. cruzi* trypomastigotes often have a “C” configuration but this is not a reliable differentiating feature.

Clinical: *T. brucei* causes human African trypanosomiasis, (African sleeping sickness). Signs and symptoms may include a skin lesion at the tsetse fly bite site, fever, swollen lymph nodes, sleep disruption, mental status changes, coma and, eventually, death. *Trypanosoma cruzi* causes Chagas disease. Acute disease may be asymptomatic or associated with a skin lesion at the reduviid bug bite site, fever, swollen lymph nodes, cardiac inflammation, and enlarged liver and spleen. Chronic disease may be asymptomatic or associated with heart and GI abnormalities.

Geographic Distribution: *T. brucei* is found in Africa while *T. cruzi* is found primarily in South and Central America and Mexico.

Comment: A buffy coat provides more sensitivity over conventional blood films. *Trypanosoma cruzi* may also be found as nonmotile amastigotes in the heart and other organs.

Dientamoeba fragilis



Microscopic Morphology: *Dientamoeba fragilis* is an ameboflagellate with an internalized flagellum that is not usually visible. It is included in the ameba section because of its close resemblance to these parasites. A cyst form has been described, but its existence remains uncertain.

Trophozoites measure 5–15 μm in greatest dimension (usual range 9–12 μm) and have 1–2 nuclei (80% have 2). On a direct preparation of fresh stool, they exhibit nonprogressive motility. The nucleus has 4–8 granular dots (arrow) rather than a single discrete karyosome, appearing fragmented. Peripheral chromatin is absent. The cytoplasm is finely granular and often contains engulfed bacteria. Rarely engulfed red blood cells are seen.

Clinical: The pathogenicity of this organism is not completely understood, but infection has been associated with diarrhea, vomiting, abdominal pain, and anorexia.

Comment: This organism is not easily identified on wet preparations; the permanently stained preparation is preferred for detection, although trophozoites may still be pale and difficult to identify with trichrome and iron-hematoxylin stains. Uninuclear forms might be confused for the trophozoites of *Endolimax nana* or *Iodamoeba buetschlii*.

Ascaris lumbricoides



Microscopic Morphology: Eggs are clear to yellow-brown and may be fertilized or unfertilized. Fertilized eggs are round to oval, thick-shelled, measure 55–75 μm x 35–50 μm , and contain a distinct unembryonated cell mass; infertile eggs are elongated and thin-shelled, measure 85–95 μm x 43–47 μm , and are filled with nondifferentiated cellular material. Both fertile and infertile forms have a mammillated (bumpy) surface; when this is lost, the eggs are said to be decorticated. In the above left image, the forms shown are fertile (bottom center), fertile decorticated (upper left corner) and infertile (upper right corner). The above right image shows a fertile egg with clear separation between the internal cell ball and thick, external shell.

Clinical: Initial larval migration through the lungs may be associated with pneumonitis and eosinophilia (Loeffler syndrome). Adults live in the small intestine. Most patients with few worms are asymptomatic, but high worm burdens may cause small-bowel obstruction. Ectopic worm migration may cause obstruction of the appendix, biliary tract, and pancreatic duct.

Geographic Distribution: Worldwide; common in areas with inadequate sanitary facilities.

Comment: *Ascaris lumbricoides* is the largest nematode (roundworm) found in the human intestinal tract. It is acquired by ingestion of food and water contaminated with soil containing infectious eggs. Decorticated eggs may resemble hookworm eggs but are differentiated by their significantly thicker wall.

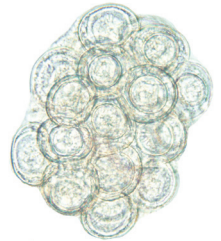
Dipylidium caninum



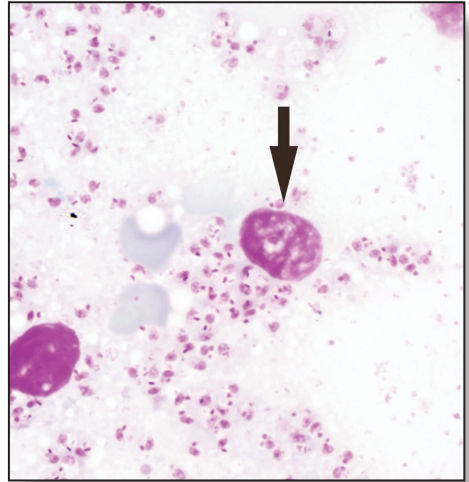
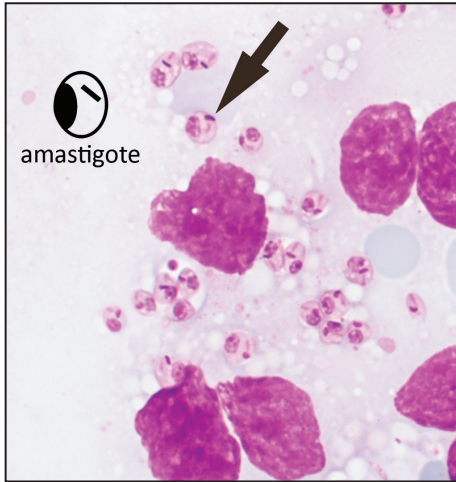
Appearance: Individual proglottids are white-tan and may be seen in chains or as individual proglottids, each measuring, on average, 12 mm x 3 mm (mature proglottids). Due to their small size and oblong or tapered shape, they are often likened to a "cucumber seed" when initially passed (above left) and "grains of rice" when dried (above right). They are often motile when freshly passed.

Clinical and Geographic Distribution – See Intestinal Helminth Ova Section

Comment: Given their small size, *Dipylidium caninum* proglottids are easily mistaken for food material in stool. Microscopic examination of the fluid submitted with the proglottid or expressed from it can identify characteristic egg packets or individual immature eggs and help to confirm the macroscopic identification. Mounting the proglottids under a coverslip and viewing with light microscopy may also allow identification of eggs and the characteristic double lateral uterine pores. Clearing with lactophenol prior to coverslipping may allow internal features to be more easily seen.



Leishmania species



Specimen Types/Preparations: Bone marrow, lymph node, and splenic aspirates, skin scrapings/biopsies; air dried smears and touch preparations stained with Giemsa.

Microscopic Morphology: Amastigotes measure 2–5 μm in diameter and contain a small, eccentric nucleus and rod-shaped kinetoplast (above left, arrow and diagram). They are present within macrophages (above right, arrow, shows a macrophage nucleus) and extracellularly.

Clinical: *Leishmania* species primarily cause cutaneous and visceral disease. Cutaneous disease manifests as skin ulcers and nodules, while visceral disease causes enlarged spleen, liver, and bone marrow infiltration. Cutaneous disease due to some Central and South American species may cause mucocutaneous disease, a destructive process of the mouth and nose.

Geographic Distribution: Tropics and subtropics.

Comment: Due to the risk of subsequent mucocutaneous disease, organisms from patients with cutaneous disease acquired in Central and South America should be identified to the species level using culture and isoenzyme analysis or molecular methods.