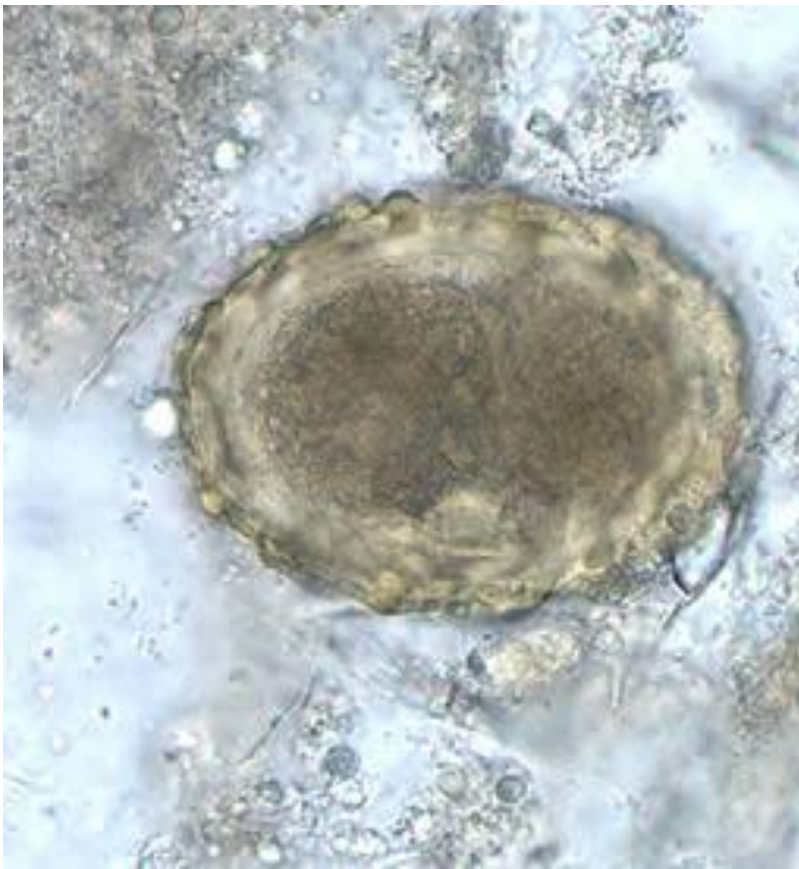
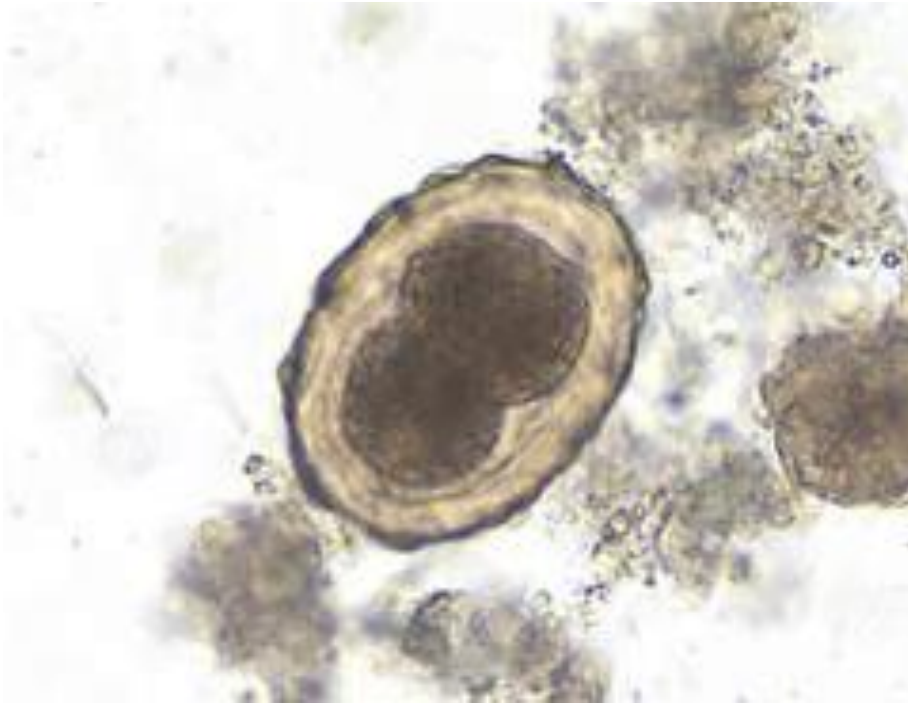


Ascaris sp egg

A. lumbricoides fertilized eggs



Ascaris lumbricoides



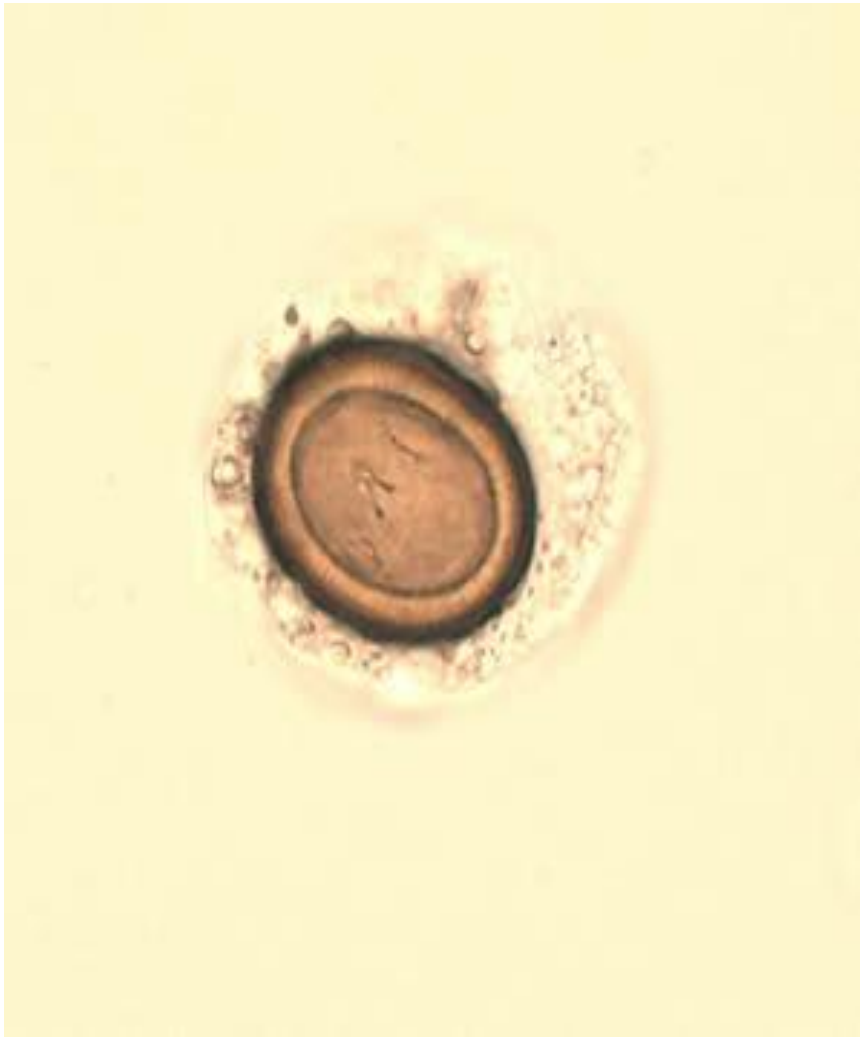
C: *A. lumbricoides* fertilized egg with embryo in the early stage of development, in a wet mount. Image taken at 200× magnification.

D: *Ascaris* fertilized egg in a wet mount with embryo in a more advanced stage of development.

Teania spp egg



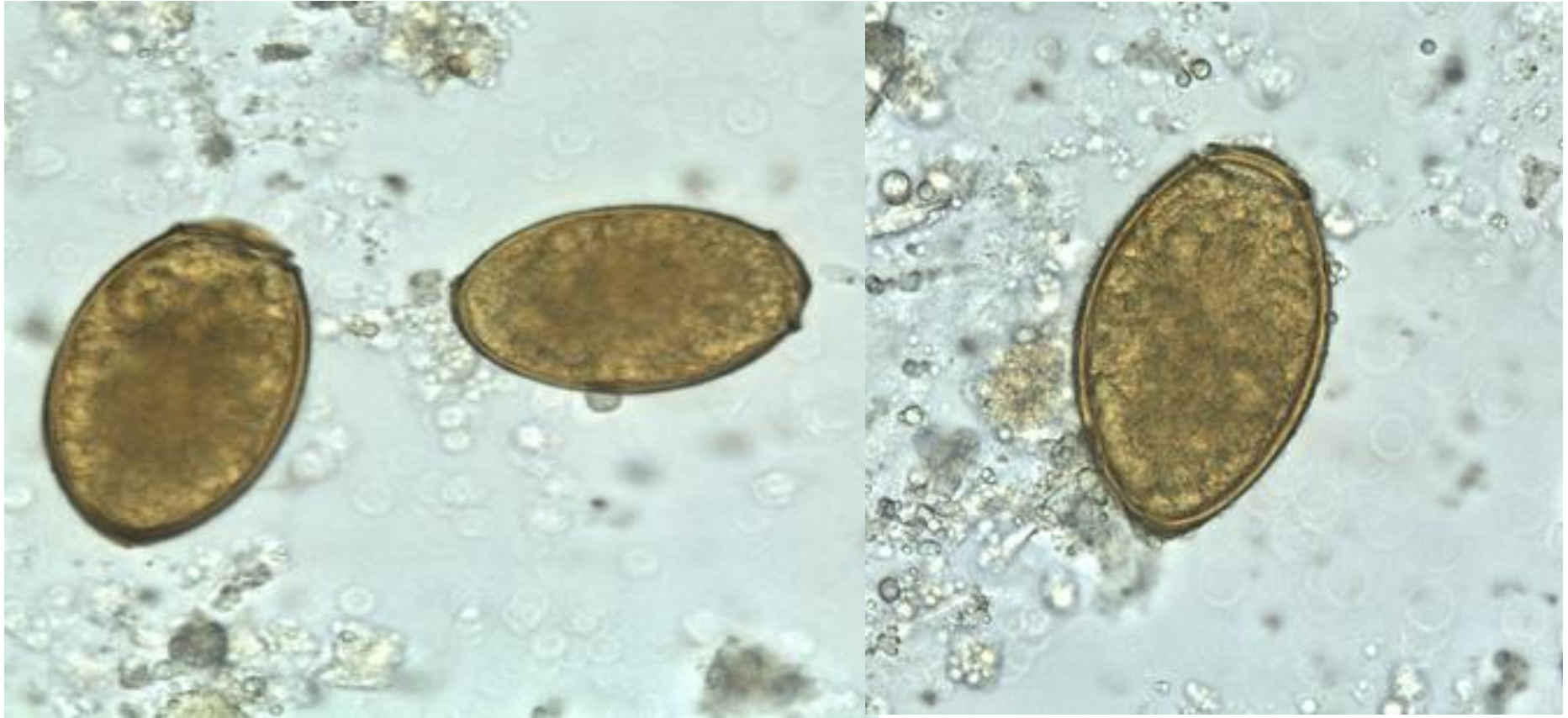
: ***Taenia* spp. eggs in unstained wet mounts.**



C: Iodine-stained wet mount of *Taenia* sp. egg in a formalin-concentrated stool specimen. Image courtesy of the Kansas State Public Health Laboratory.

D: Iodine-stained wet mount of a *Taenia* sp. egg. Image courtesy of the Oregon State Public Health Laboratory.

Paragonimus westermani



C, D: Eggs of *P. westermani* in an unstained wet mount.

G. Intestinalis cysts-iodine prep





E, F: *G. intestinalis* cysts in a wet mount stained with iodine.

G. intestinalis trophozoite in a wet mount

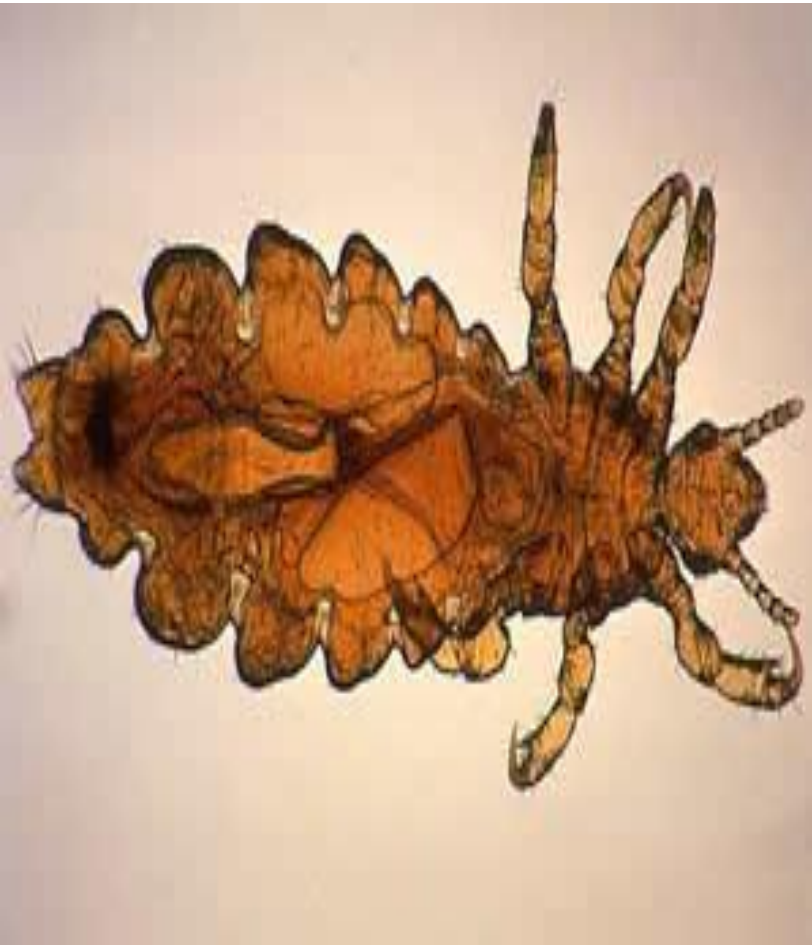


Dracunculus medinensis



Pediculus humanus capitis

Adults of *Pediculus humanus capitis* are 3-4 mm in length and dorsoventrally flattened. The tarsal segments are adapted for clinging to the host's hair. Antennae are short and consist of five segments. They have piercing-sucking mouthparts.



A: Adult female louse

B: Adult louse

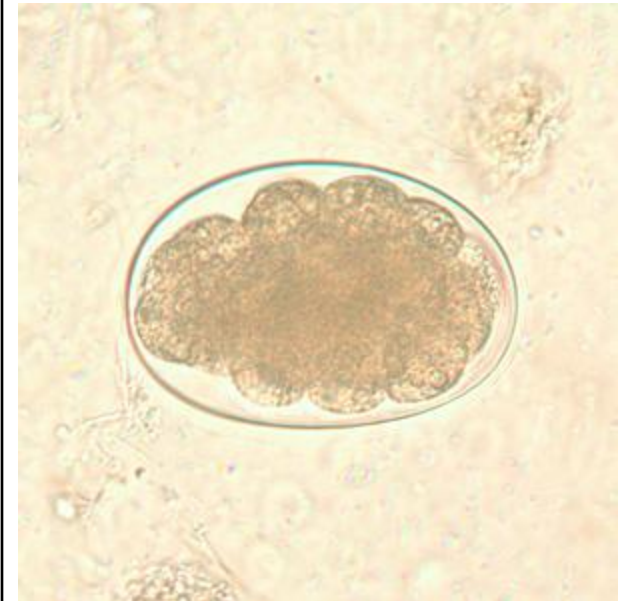
HOOKWORM EGG

[Last Modified: 06/17/2008 17:18:54]

The eggs of *Ancylostoma* and *Necator* cannot be differentiated microscopically. The eggs are thin-shelled, colorless and measure 60-75 μm by 35-40 μm .



A



B

A, B: Hookworm eggs in unstained wet mounts, taken at 400 \times magnification.

Echinococcus spp

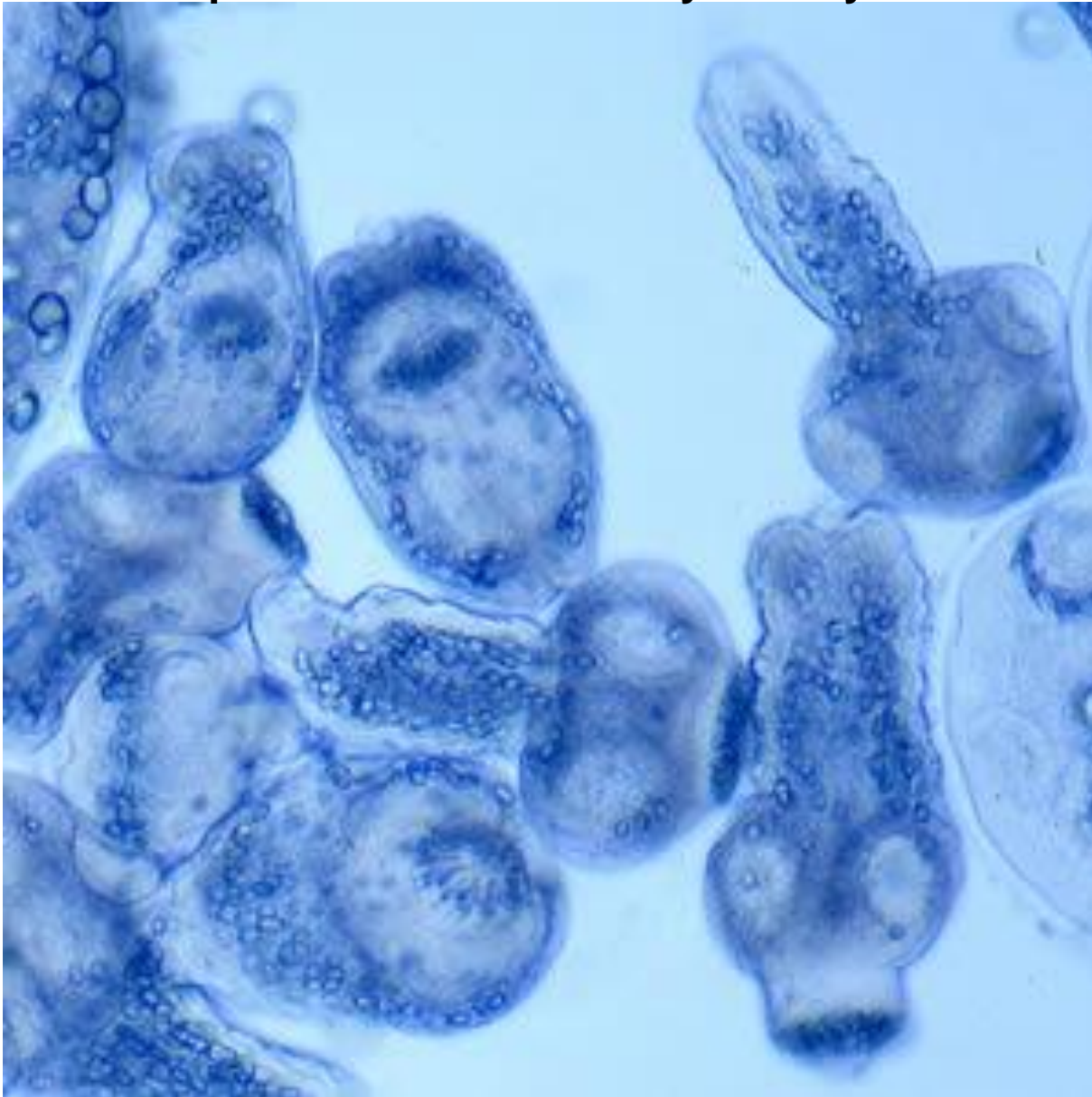
Dogs and other canids are the definitive hosts for *Echinococcus* spp.; humans are only infected by the larvae after ingestion of eggs from food, water or fomites contaminated with dog feces. Upon ingestion of the eggs by the human host, the oncospheres migrate from the intestinal lumen to other body sites and develop into hydatid cysts. These cysts can be found in any part of the body, but are most common in the liver, lung and central nervous system.



A: "Hydatid sand." Fluid aspirated from a hydatid cyst will show multiple protoscolices (size approximately 100 μ m), each of which has typical hooklets. The protoscolices are normally invaginated (left), and evaginate (middle, then right) when put in saline. Image contributed by Georgia Division of Public Health.

B: Scolex from hydatid cyst.

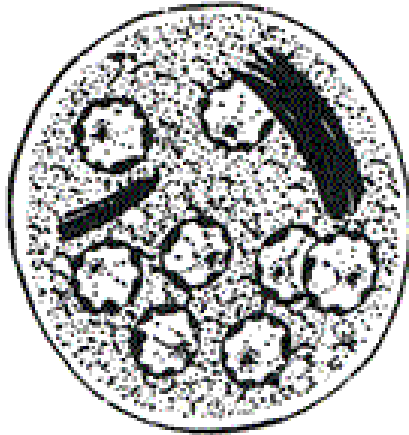
protoscolices from a hydatid cyst



Multiple protoscolices liberated from a hydatid cyst.

Entamoeba coli

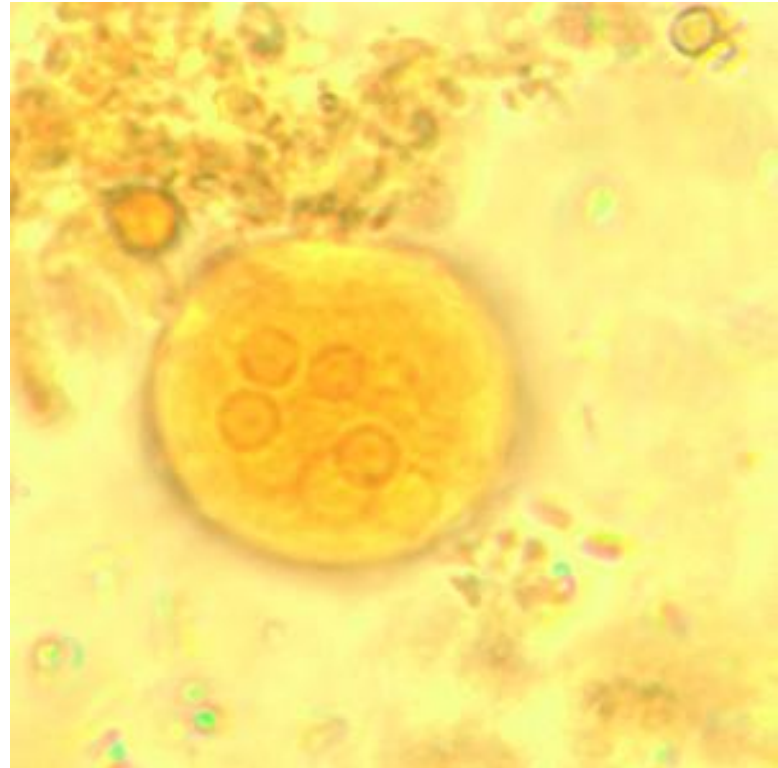
Mature *Entamoeba coli* cysts typically have 8 nuclei, and measure usually 15 to 25 μm (range 10 to 35 μm). *E. coli* is the only species of *Entamoeba* with more than four nuclei in the cyst stage. Chromatoid bodies are seen less frequently than in *E. histolytica*. When present they are usually splinter like with pointed ends and thus different from the chromatoid bodies of *E. histolytica*, which have rounded ends.



A: Line drawing of an *E. coli* cyst.

B: *E. coli* cyst in a concentrated wet mount.

Entamoeba.coli



- C:** *E. coli* cyst in a concentrated wet mount stained with iodine. The cyst in **C** shows 5 nuclei in this focal plane.
D: *E. coli* cyst in a formalin concentrated wet mount stained with iodine.

Entamoeba histolytica cysts

Mature *Entamoeba histolytica* cysts have 4 nuclei that characteristically have centrally located karyosomes and fine, uniformly distributed peripheral chromatin. Cysts usually measure 12 to 15 μm .



A

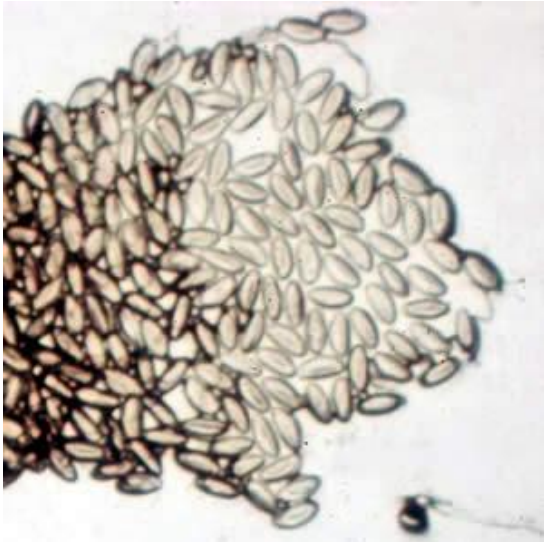


B

A: Line drawing of an *E. histolytica* cyst.

B: *E. histolytica* cyst in a concentrated wet mount stained with iodine. The cysts are spherical and often have a halo. The cyst in **B** appears uniuucleate

Enterobius spp



Eggs of *E. vermicularis* in a cellulose-tape preparation.



Eggs of *E. vermicularis* in a wet mount.



Egg of *E. vermicularis* in an iodine-stained wet mount from a formalin concentrate.

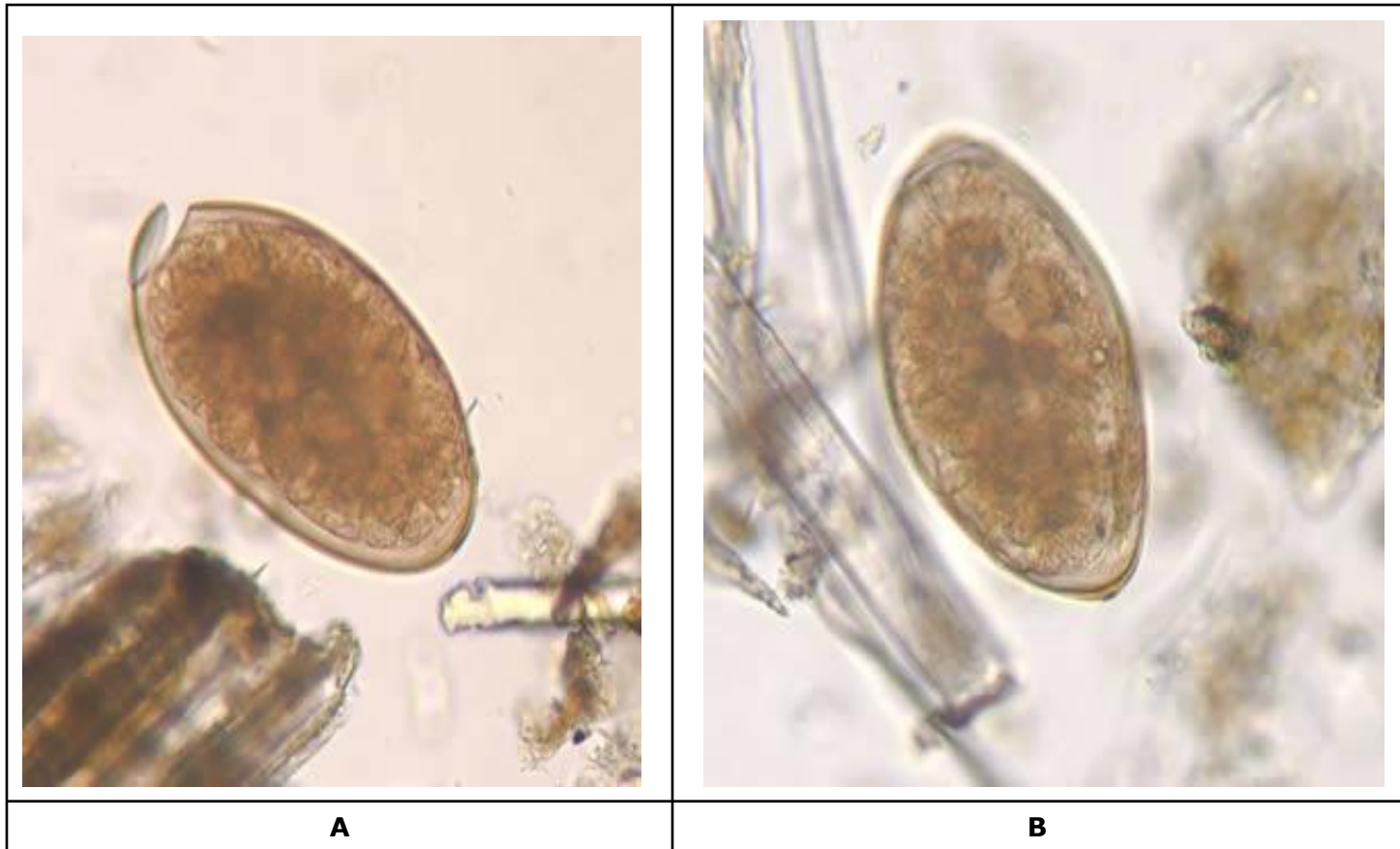
Adult male of *Enterobius vermicularis*

Adult males of *Enterobius vermicularis* measure up to 2.5 mm long by 0.1-0.2 mm wide; adult females measure 8-13 mm long by 0.3-0.5 mm wide. Adult males have a blunt posterior end with a single spicule; females possess a long pointed tail. In both sexes, there are cephalic expansions.



Fasciola hepatica egg

Eggs of *Fasciola hepatica* are broadly ellipsoidal, operculated and measure 130-150 μm long by 60-90 μm wide. The eggs are unembryonated when passed in feces. The eggs of *F. hepatica* can be difficult to distinguish from *Fasciolopsis* spp., although the abopercular end of the former often has a roughened or irregular area.



A, B: Eggs of *F. hepatica* in an unstained wet mount, taken at 400x magnification.

Adult of *F. hepatica*

Adults of *Fasciola hepatica* are large and broadly-flattened, measuring up to 30 mm long and 15 mm wide. The anterior end is cone-shaped, unlike the rounded anterior end of *Fasciolopsis buski*. Adults reside in the bile ducts of the liver in the definitive host.



A



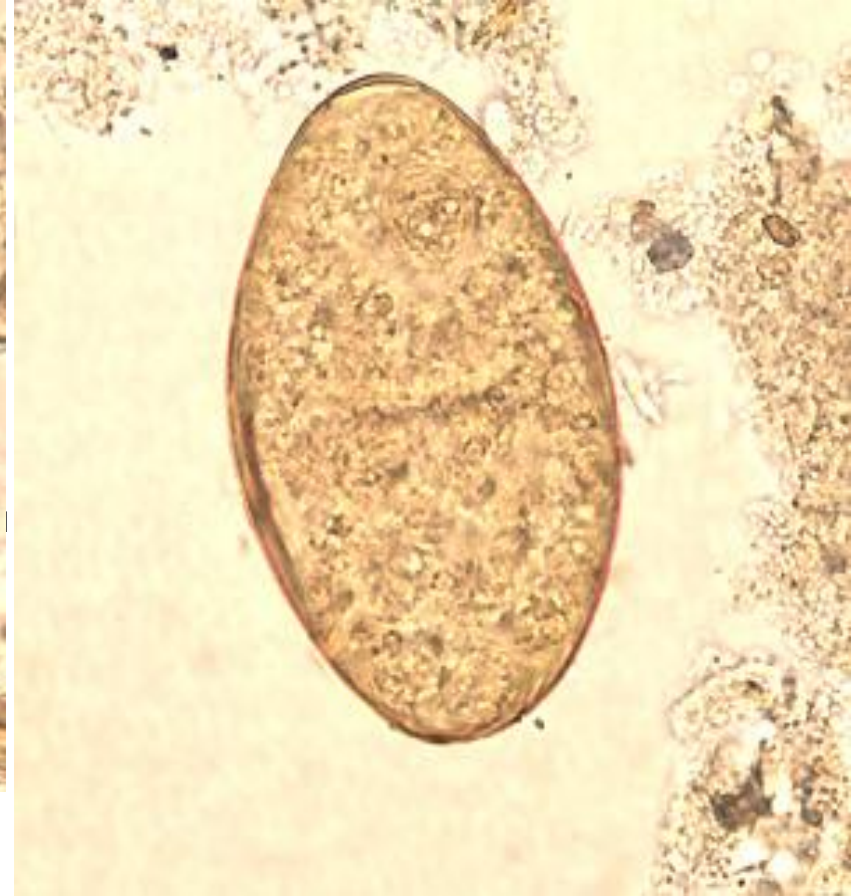
B

A: Unstained adult of *F. hepatica* fixed in formalin.

B: Adult of *F. hepatica* stained with carmine.

F. buski egg

Eggs of *Fasciolopsis buski* are broadly ellipsoidal, operculated and measure 130-150 μm long by 60-90 μm wide. The eggs are unembryonated when passed in feces. The eggs of *F. buski* can be difficult to distinguish from *Fasciola hepatica*, although the abopercular end of the latter often has a roughened or irregular area.



Egg of *F. buski*



E: Higher magnification (400x) of the egg in Figure **D**.

Adults of *F. buski*

Adults of *F. buski* measure 20-75 mm long and have poorly-developed oral and ventral suckers. Adults reside in the intestine of the main host.



A



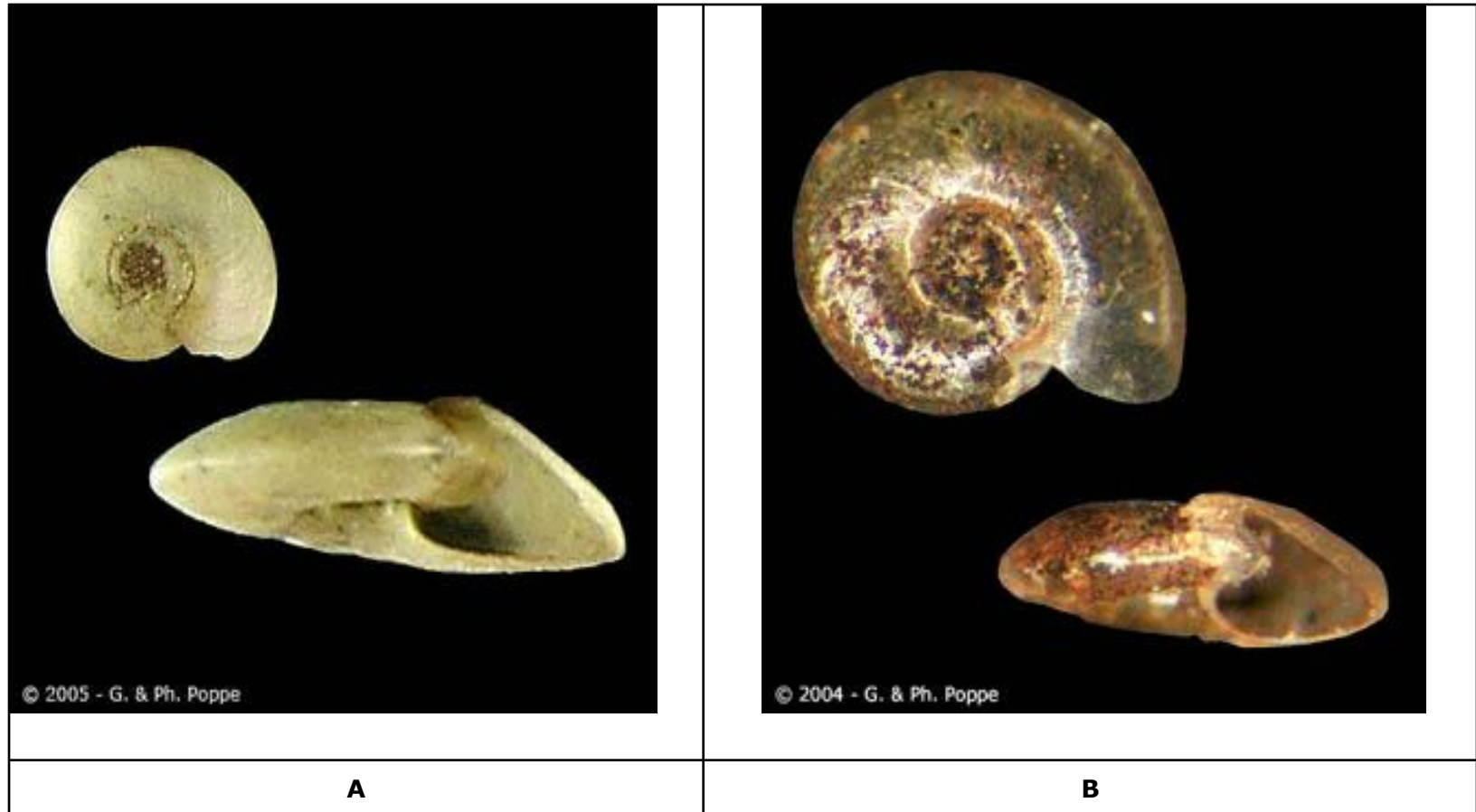
B

A: Adult fluke of *F. buski*.

B: Adult fluke of *F. buski*.

The snails used by *F. buski* are small planorbid snails in the genera *Hippeutis* and *Segmentina*.

Fasciolopsis buski requires a snail intermediate host for completion of its life cycle. The snails used by *F. buski* are small planorbid snails in the genera *Hippeutis* and *Segmentina*.



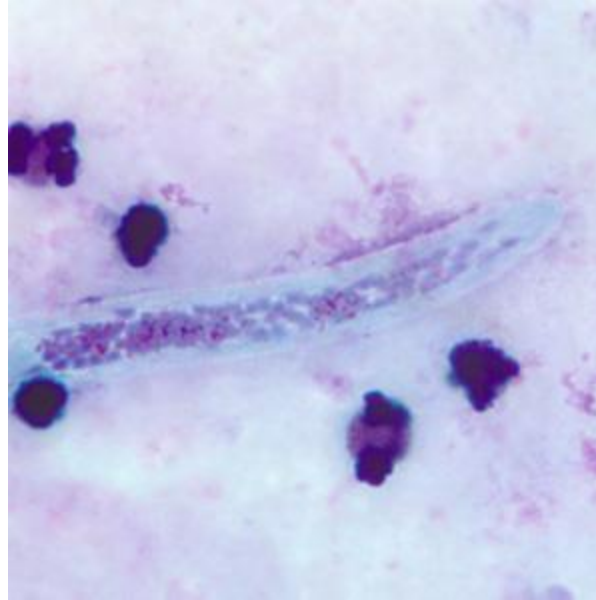
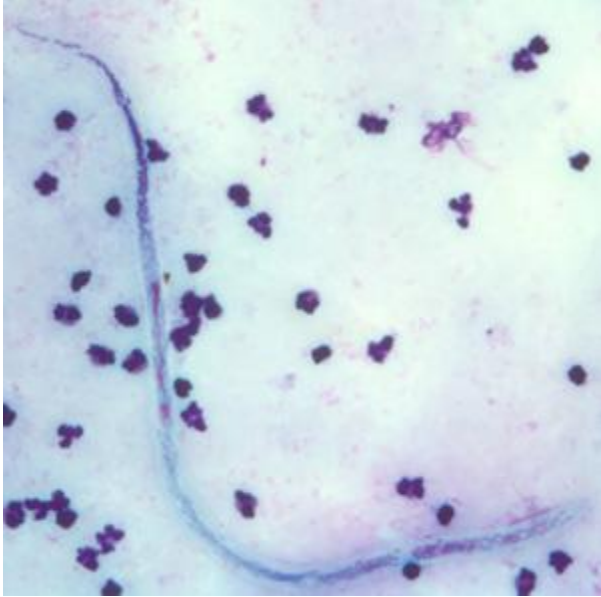
A: Snail in the genus *Hippeutis*, an intermediate host for *F. buski*. Image courtesy of Conchology, Inc, Mactan Island, Philippines.
B: Snail in the genus *Segmentina*, an intermediate host for *F. buski*. Image courtesy of Conchology, Inc, Mactan Island, Philippines.

Wuchereria bancrofti

The microfilariae of *Wuchereria bancrofti* are sheathed and measure 240-230 μm in stained blood smears and 275-320 μm in 2% formalin. They have a gently curved body, and a tail that is tapered to a point. The nuclear column (the cells that constitute the body of the microfilaria) is loosely packed; the cells can be visualized individually and do not extend to the tip of the tail. Microfilariae circulate in the blood.



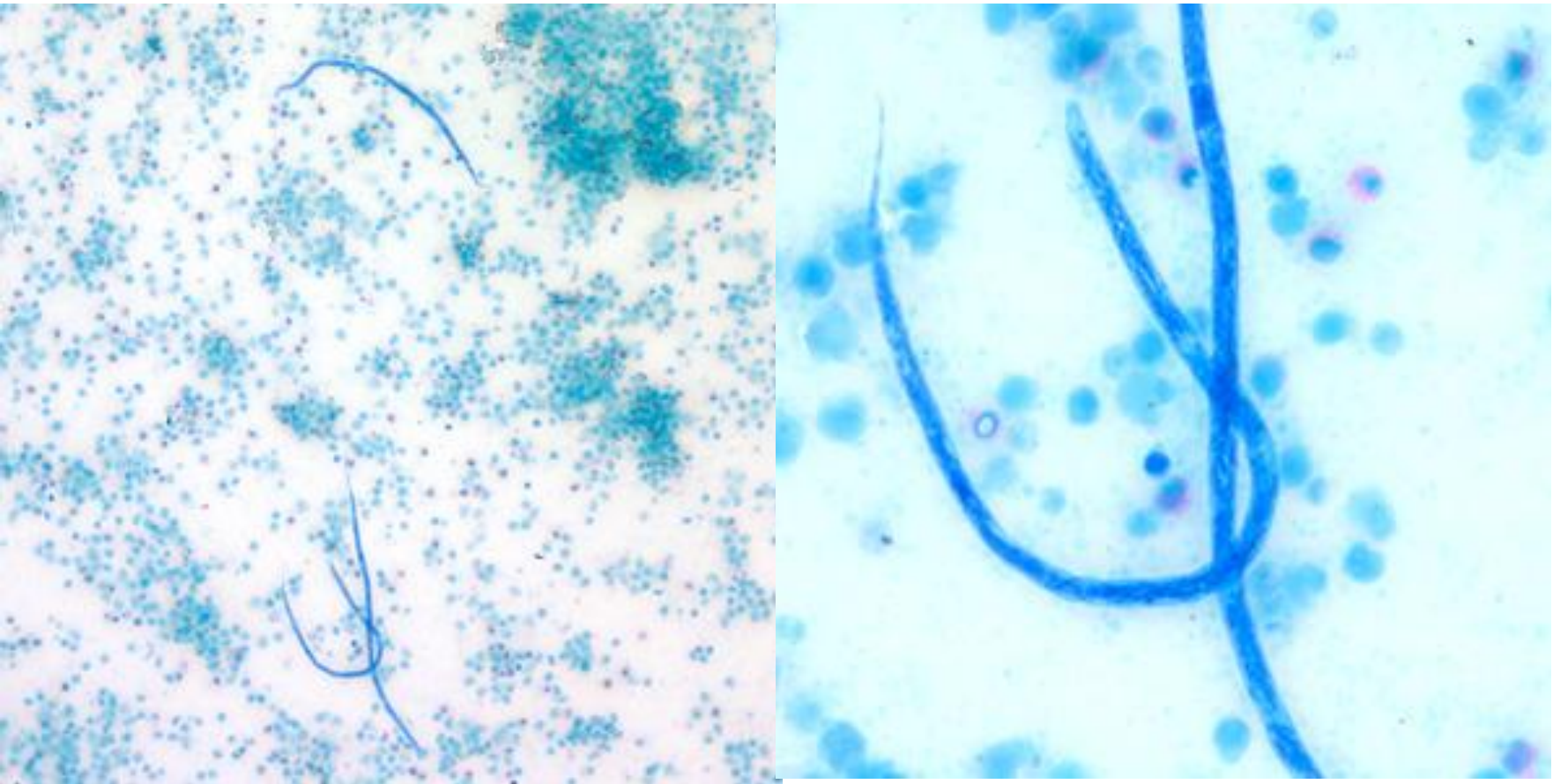
A, B: Microfilariae of *W. bancrofti* in thick blood smears stained with Giemsa. Images courtesy of the Oregon State Public Health Laboratory



E: Close-up of the posterior end of the worm in Figure C.

Loa loa

Microfilariae of *Loa loa* are sheathed and measure 230-250 μm long in stained blood smears and 270-300 μm in 2% formalin. The tail is tapered and nuclei extend to the tip of the tail. Microfilariae circulate in the blood.

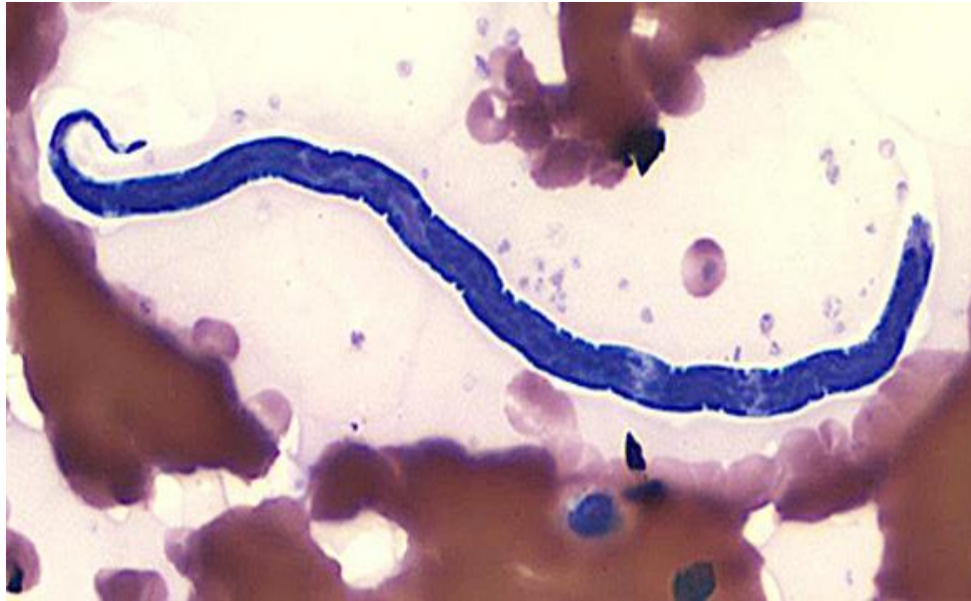


A: Microfilariae of *L. loa* captured by the Knotts concentration technique. Image taken at 100x magnification.

B: Higher magnification of the microfilariae in Figure **A**, taken at 500x oil magnification.

Loa loa filarial worm

Microfilariae of *Loa loa* are sheathed and measure 230-250 μm long in stained blood smears and 270-300 μm in 2% formalin. The tail is tapered and nuclei extend to the tip of the tail. Microfilariae circulate in the blood.



A

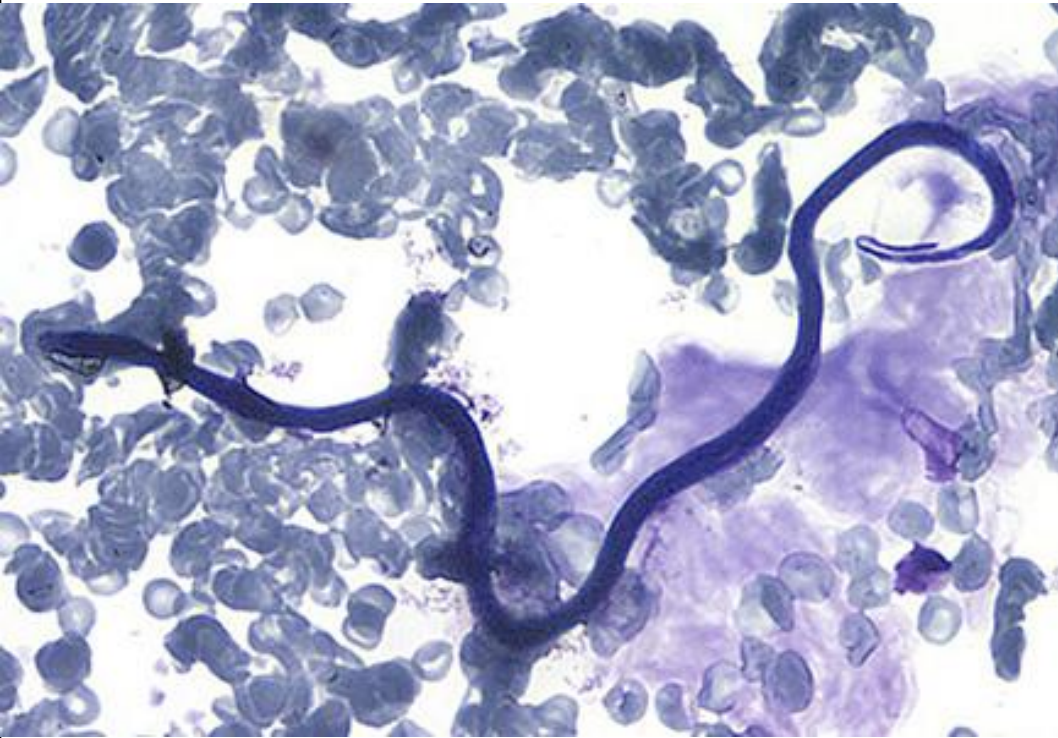


B

A: Microfilaria of *L. loa* in a thin blood smear, stained with Giemsa.

B: Microfilaria of *L. loa* in a thick blood smear from a patient from Cameroon, stained with Giemsa. Note the nuclei extending to the tip of the tail to the left of the image.

Microfilaria of *L. loa* in a thin blood smear



C

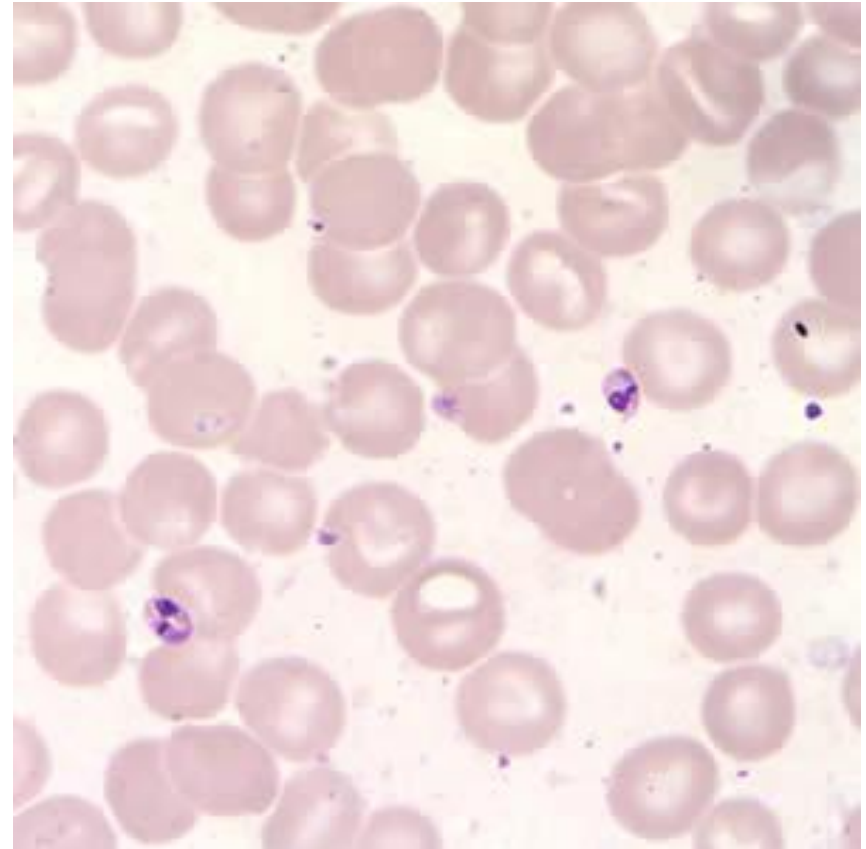
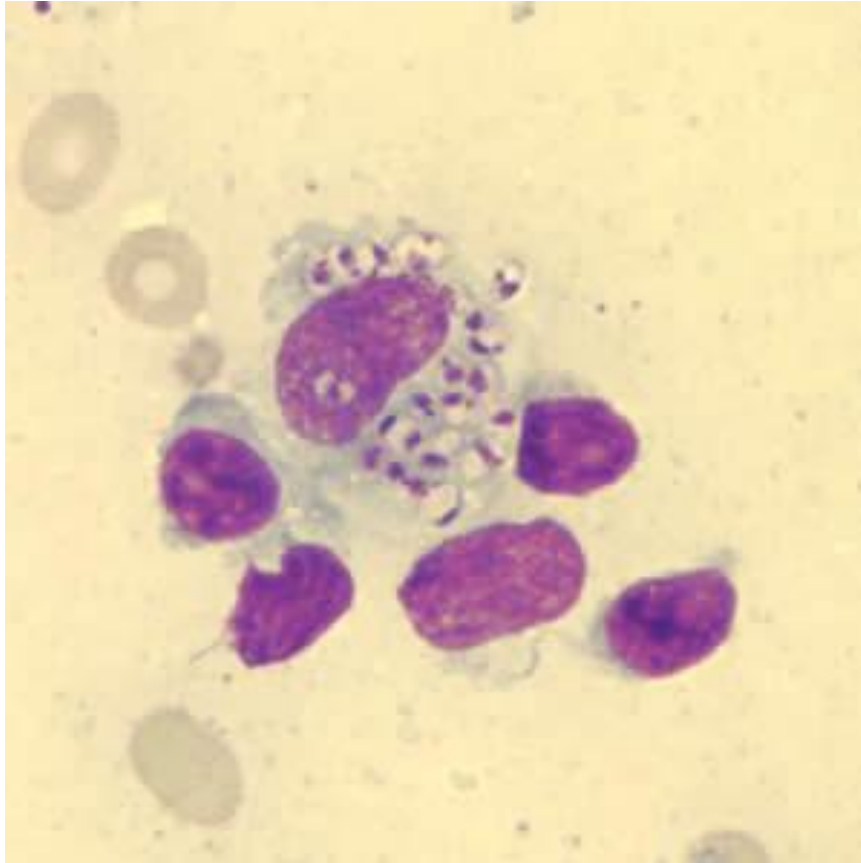


D

C: Microfilaria of *L. loa* in a thin blood smear, stained with Giemsa.
D: Microfilaria of *L. loa* in a thick blood smear, stained with Giemsa.

Leishmania Amastigotes

Amastigotes of *Leishmania* are spherical to ovoid and measure 1-5 μm long by 1-2 μm wide. They possess a large nucleus, a prominent kinetoplast, and a short axoneme, the last of which is rarely visible by light microscopy. The organisms reside in macrophages of the host and can be found throughout the body.

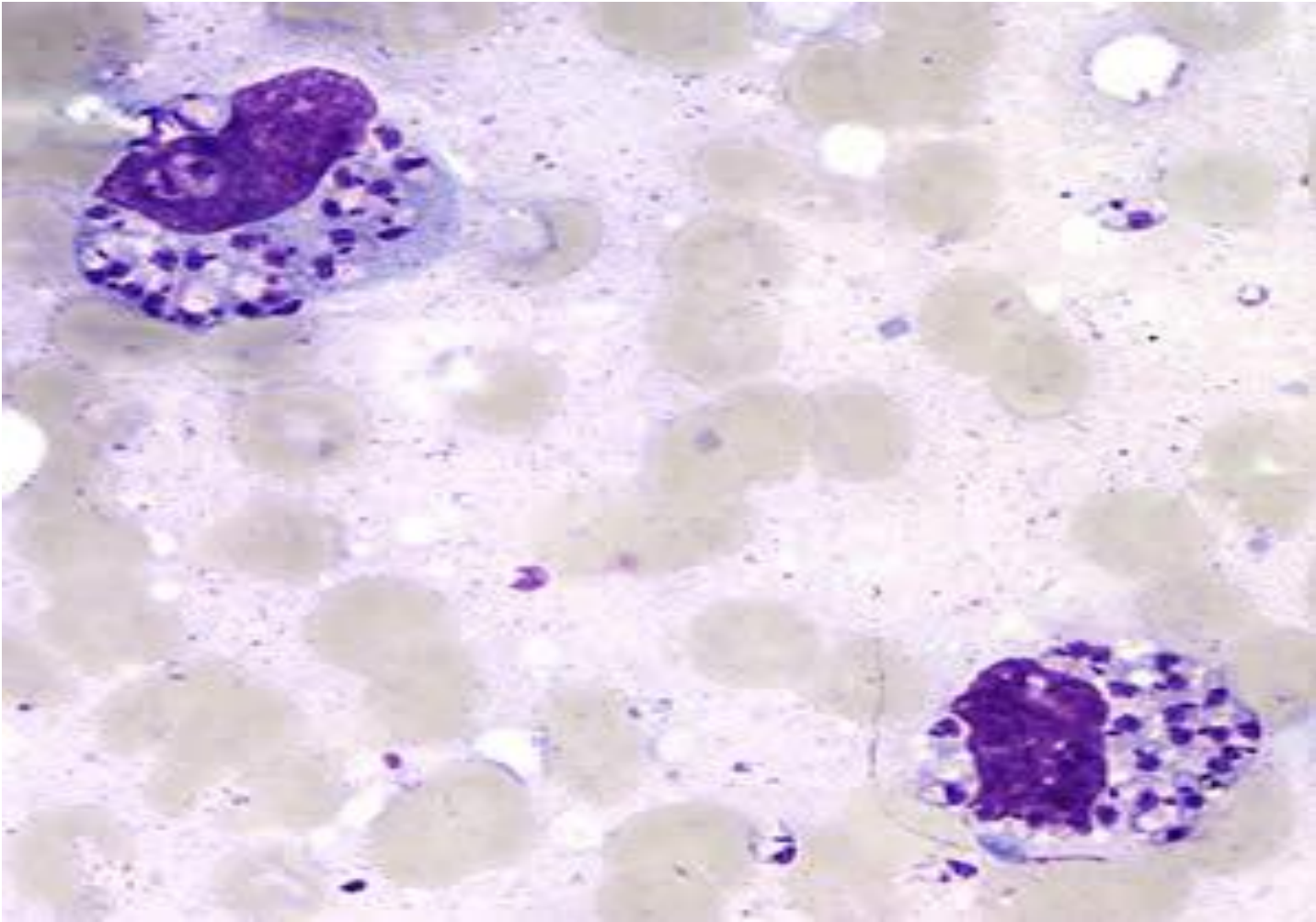


A: *Leishmania* spp. amastigotes in a Giemsa-stained tissue scraping.

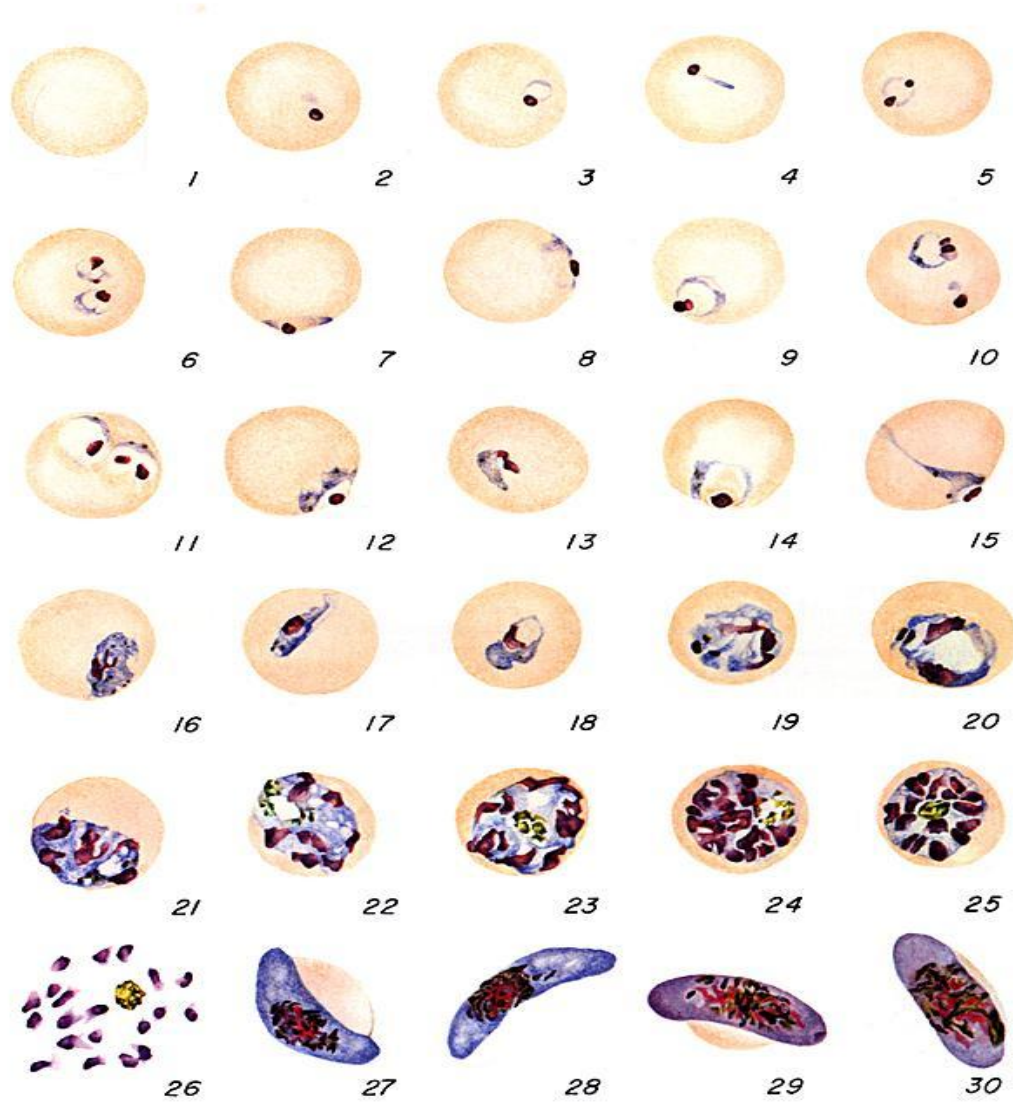
B: *Leishmania (Viannia) panamensis* amastigotes in a Giemsa-stained tissue scraping. Identification to the species level is not possible based on morphology and other diagnostic techniques such as isoenzyme assay or PCR are needed.

Leishmania Amastigotes

- *Leishmania* are spherical to ovoid and measure 1-5 μm long by 1-2 μm wide. They possess a large nucleus, a prominent kinetoplast, and a short axoneme, the last of which is rarely visible by light microscopy. The organisms reside in macrophages of the host and can be found throughout the body.



Plasmodium falciparum



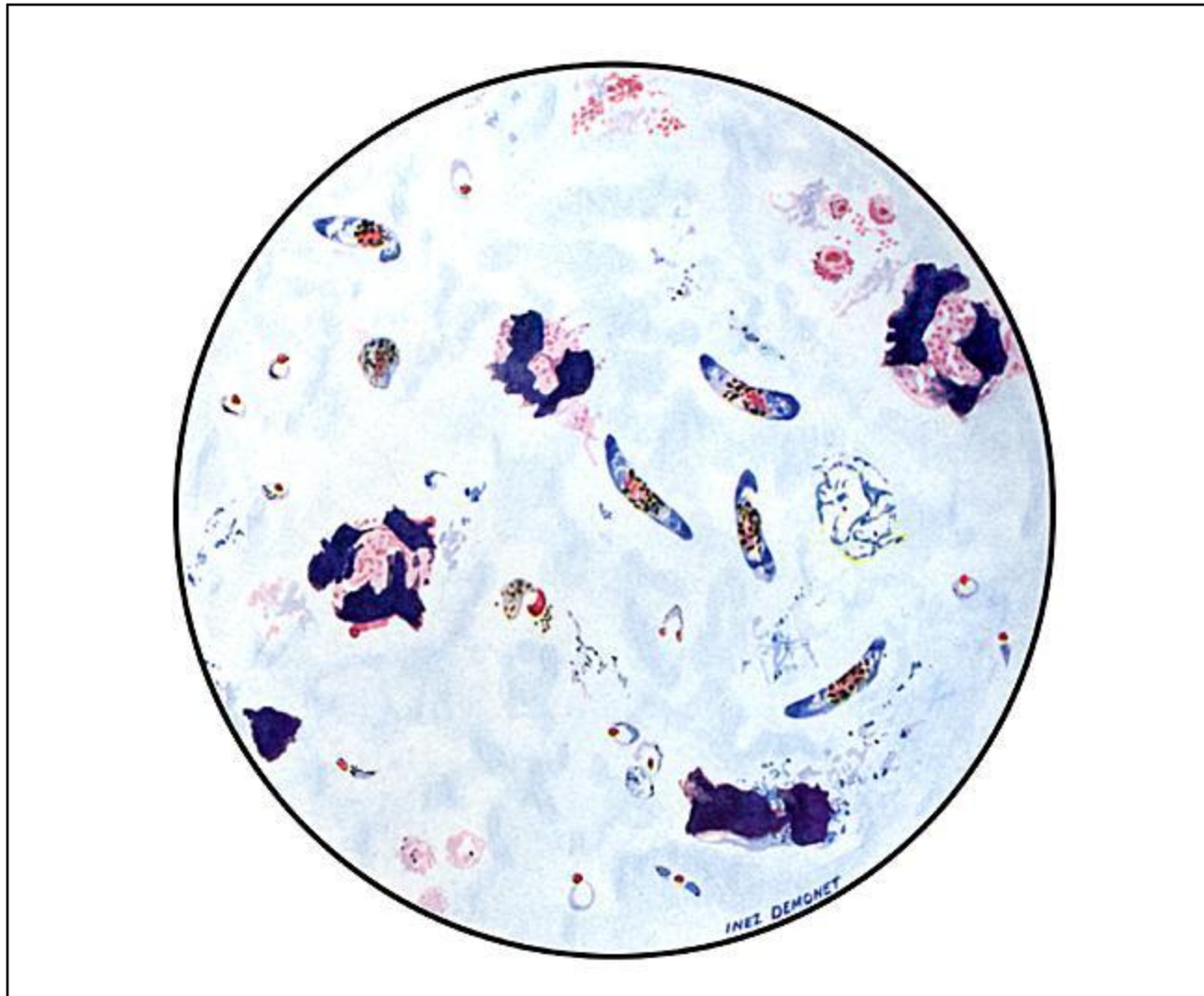
0 10 μ

PLASMODIUM FALCIPARUM

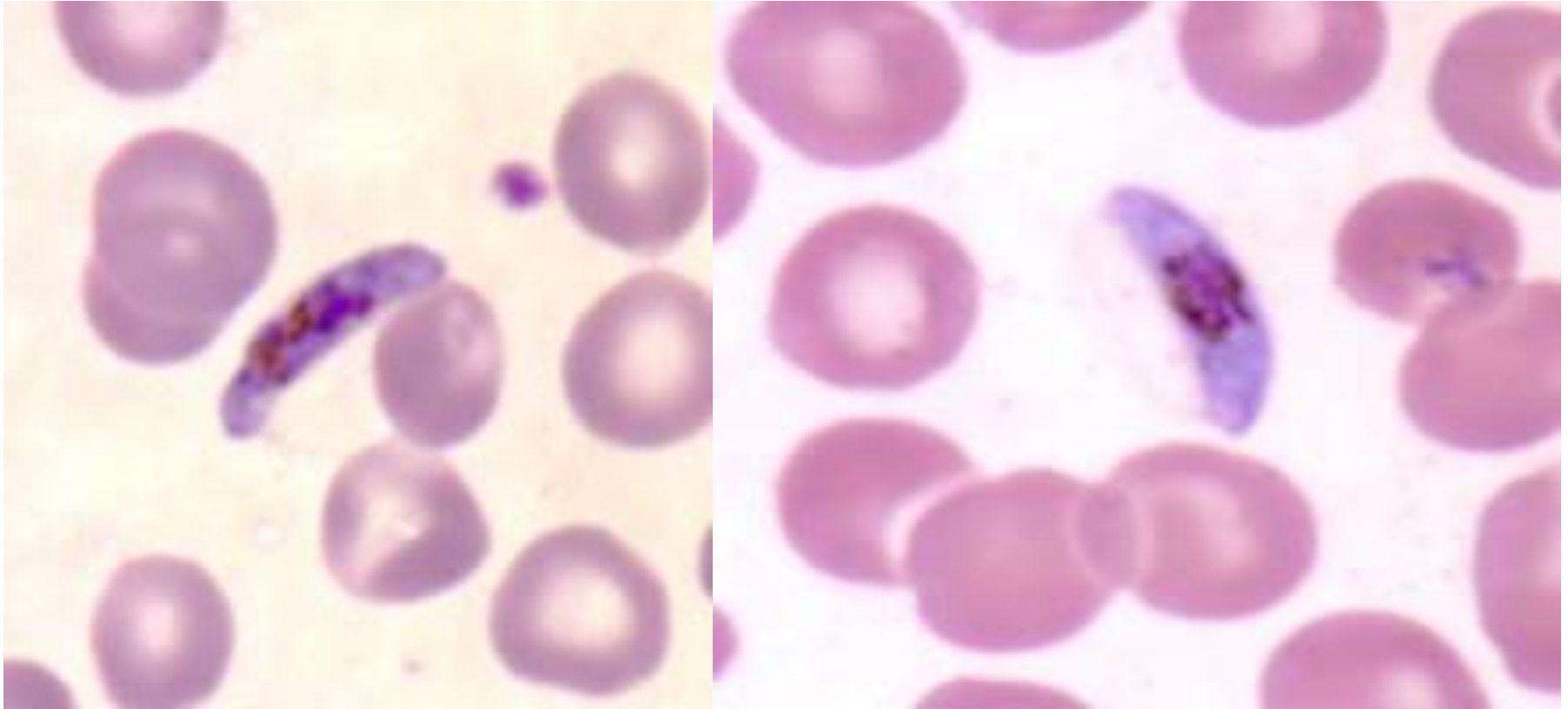
S. H. Nicholson

Thick Blood Smears

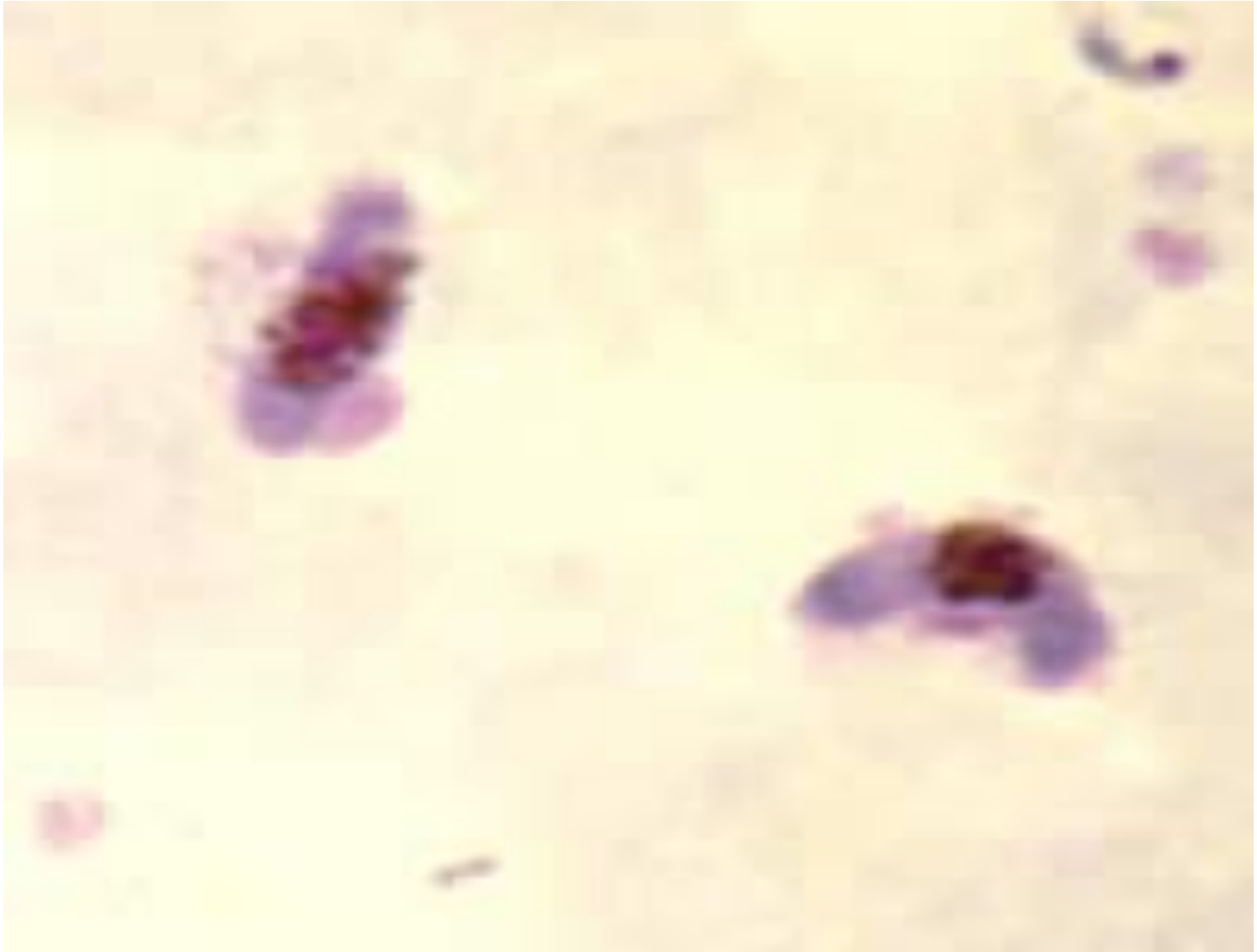
Illustrations from: Wilcox A. Manual for the Microscopical Diagnosis of Malaria in Man. Washington: U.S. Department of Health, Education and Welfare; 1960.



Plasmodium falciparum: Gametocytes

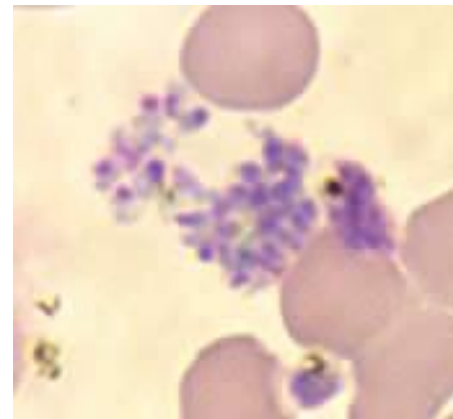
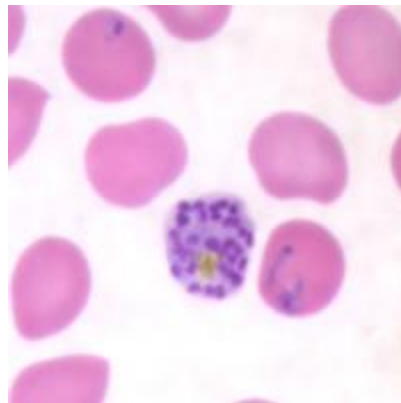
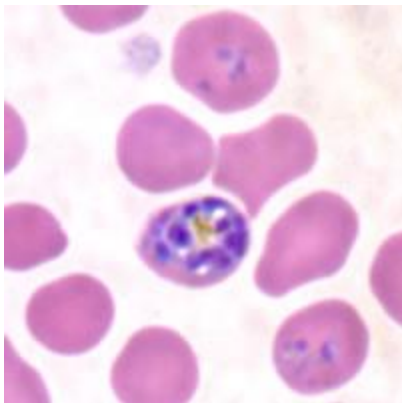
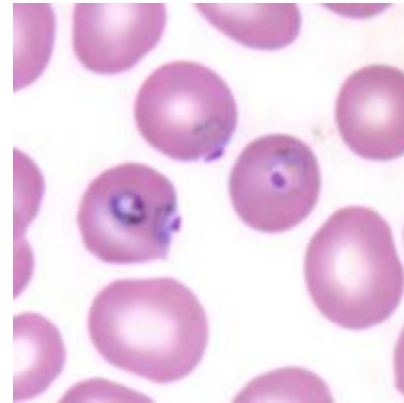
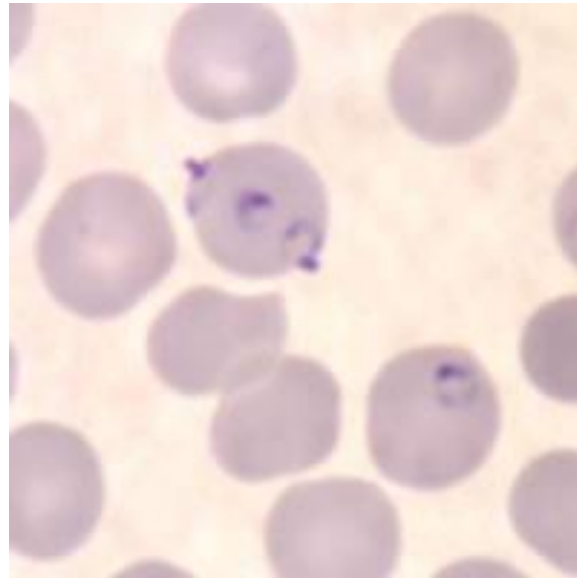
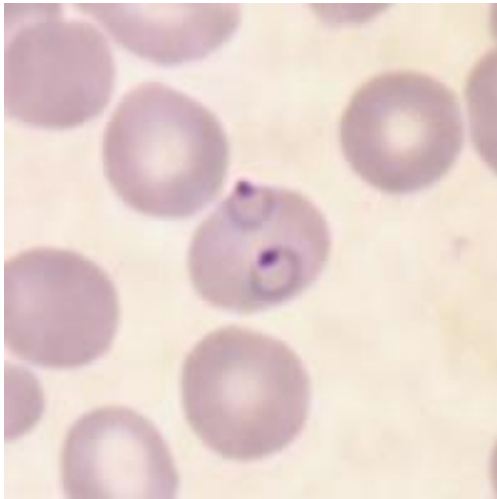


gametocytes of *P. falciparum* in a thick blood smear.



Plasmodium falciparum: Ring Stage Parasites

Plasmodium falciparum rings have delicate cytoplasm and 1 or 2 small chromatin dots. Red blood cells (RBCs) that are infected are not enlarged; multiple infection of RBCs more common in *P. falciparum* than in other species. Occasional appliqué forms (rings appearing on the periphery of the RBC) can be present.



Plasmodium malariae

Plasmodium malariae: Blood Stage Parasites

Thin Blood Smears

Illustrations from: Coatney GR, Collins WE, Warren M, Contacos PG. The Primate Malariae. Bethesda: U.S. Department of Health, Education and Welfare; 1971.

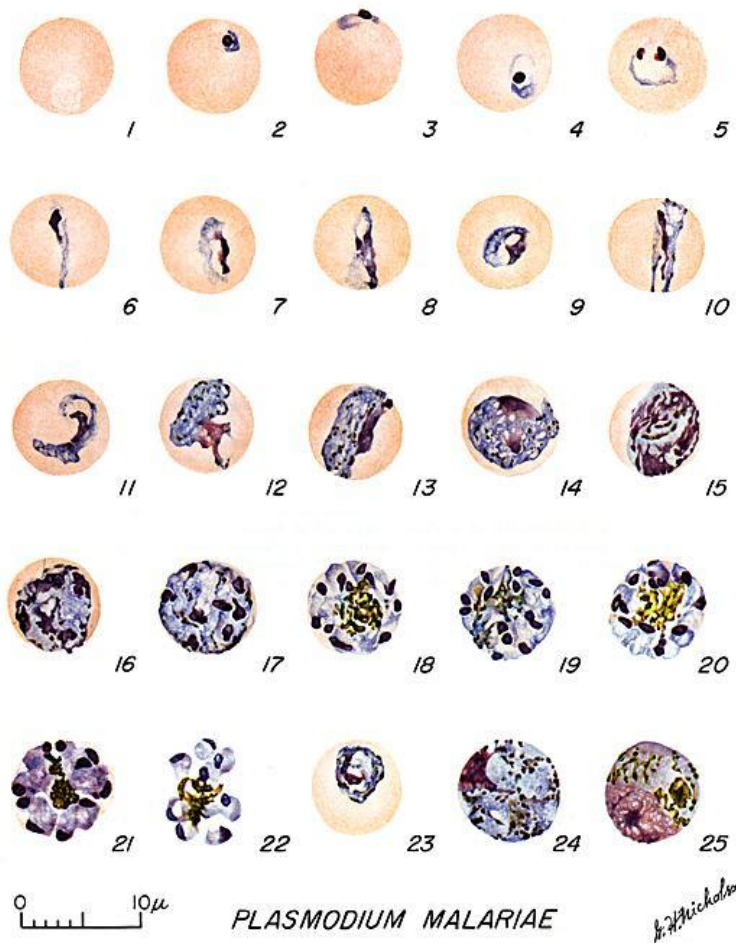
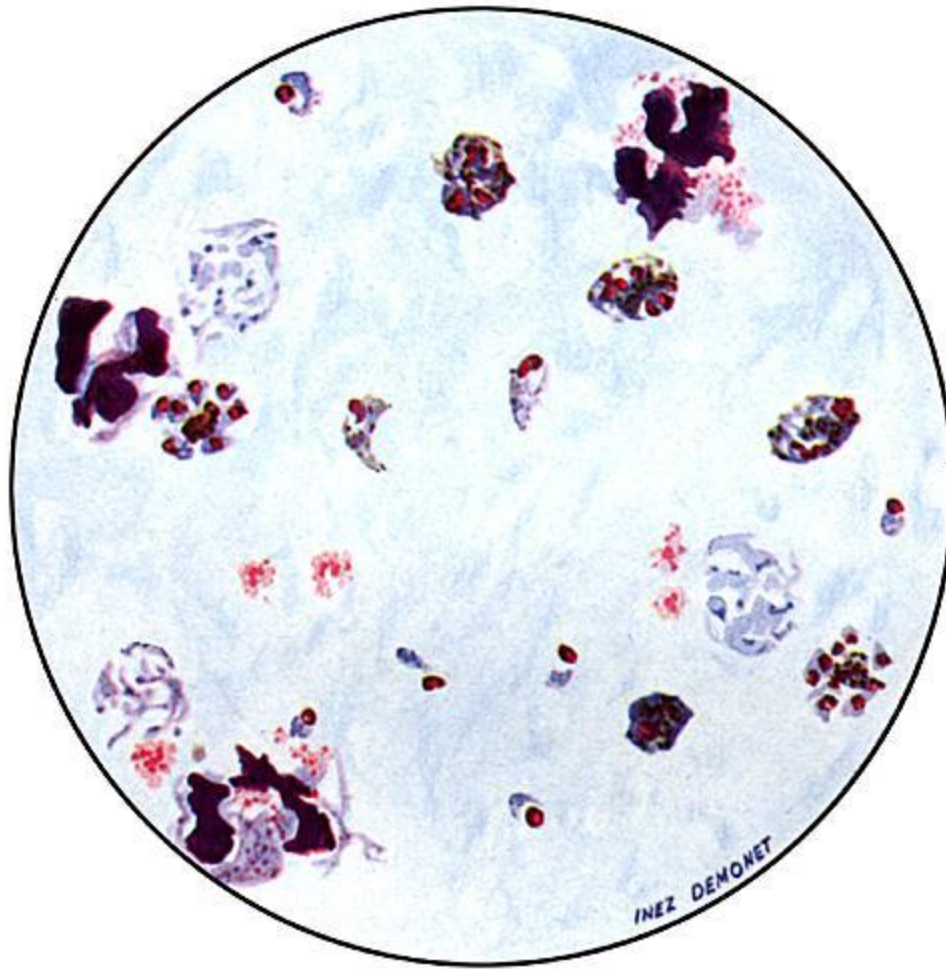


Fig. 1: Normal red cell; **Figs. 2-5:** Young trophozoites (rings); **Figs. 6-13:** Trophozoites; **Figs. 14-22:** Schizonts; **Fig. 23:** Developing gametocyte; **Fig. 24:** Macrogametocyte (female); **Fig. 25:** Microgametocyte (male).

Plasmodium malariae

Thick Blood Smears

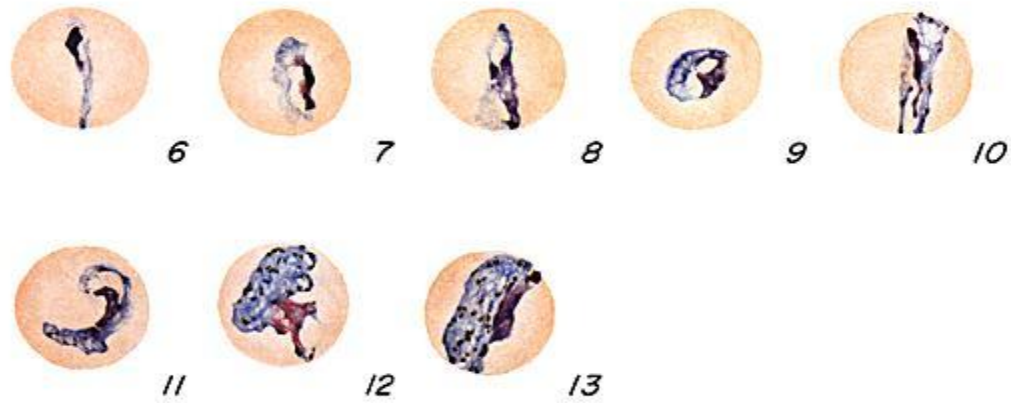


Plasmodium malariae: **Ring Stage Parasites**



Fig. 1: Normal red cell; **Figs. 2-5:** Rings.

Plasmodium malariae: **Trophozoites**



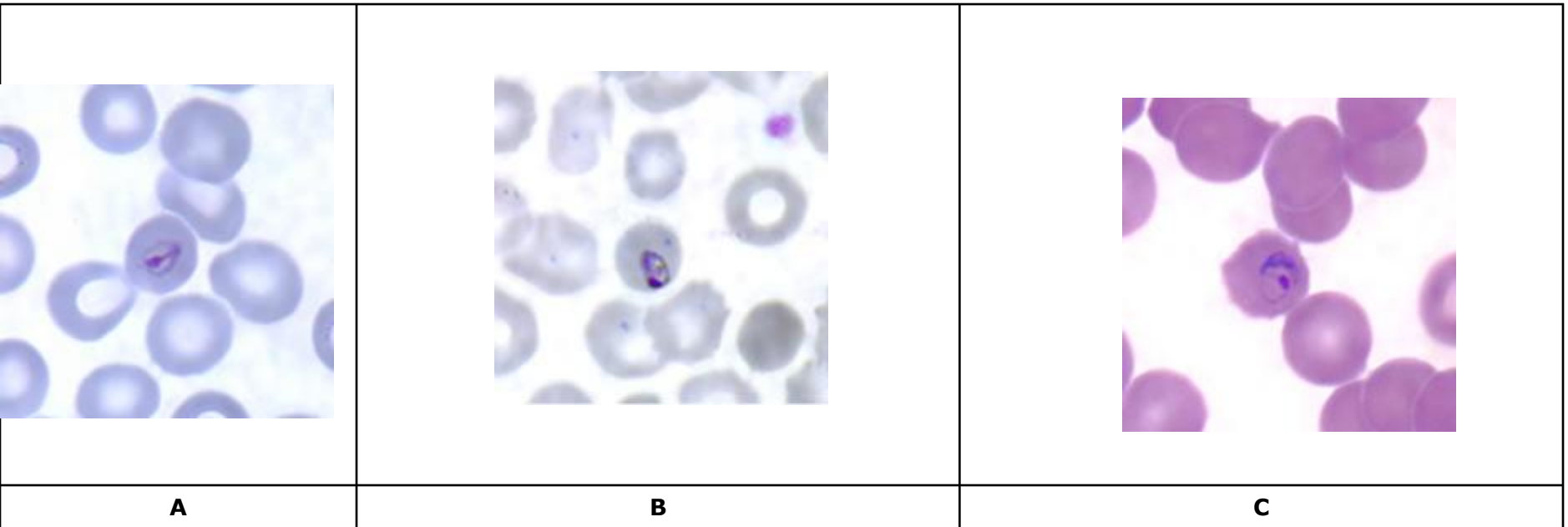
Figs. 6-13: Increasingly mature trophozoites; **Fig. 13** is a "band form".

Plasmodium malariae: Ring Stage Parasites

Plasmodium malariae: Ring Stage Parasites

Smears from patients:

Plasmodium malariae rings have sturdy cytoplasm and a large chromatin dot. The red blood cells (RBCs) are normal to smaller than normal ($3/4 \times$) in size.



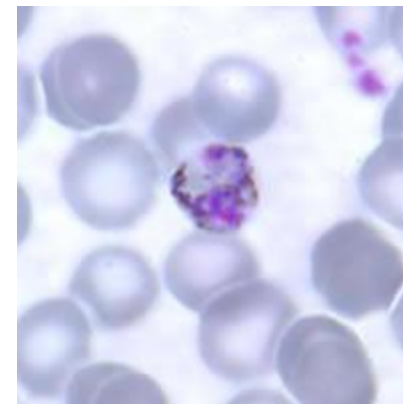
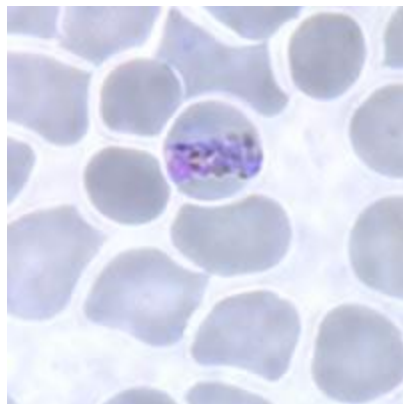
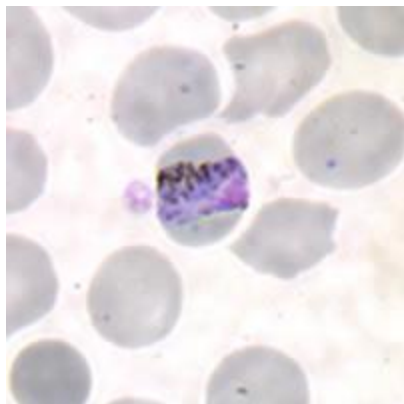
A, B, C: Ring forms in thin blood smears.

Plasmodium malariae: Trophozoites and a gametocyte

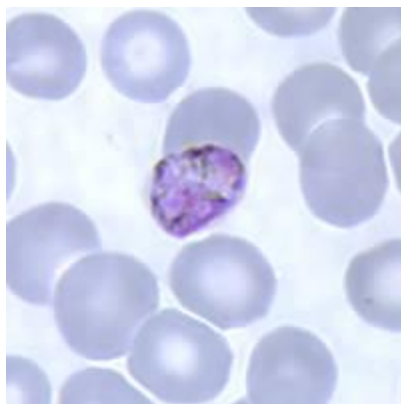
Plasmodium malariae: Trophozoites

Smears from patients:

Plasmodium malariae trophozoites have compact cytoplasm and a large chromatin dot. Occasional band forms and/or "basket" forms with coarse, dark-brown pigment can be seen.



A, B, C: Mature trophozoites in thin blood smears. **A** and **B** are band forms. **C** is a "basket" form.



Plasmodium

malariae: Gametocytes

Smears from patients:

Plasmodium malariae gametocytes are round to oval with scattered brown pigment; may almost fill red blood cell (RBC). The RBCs are normal to smaller than normal (3/4 \times) in size.

Plasmodium ovale:

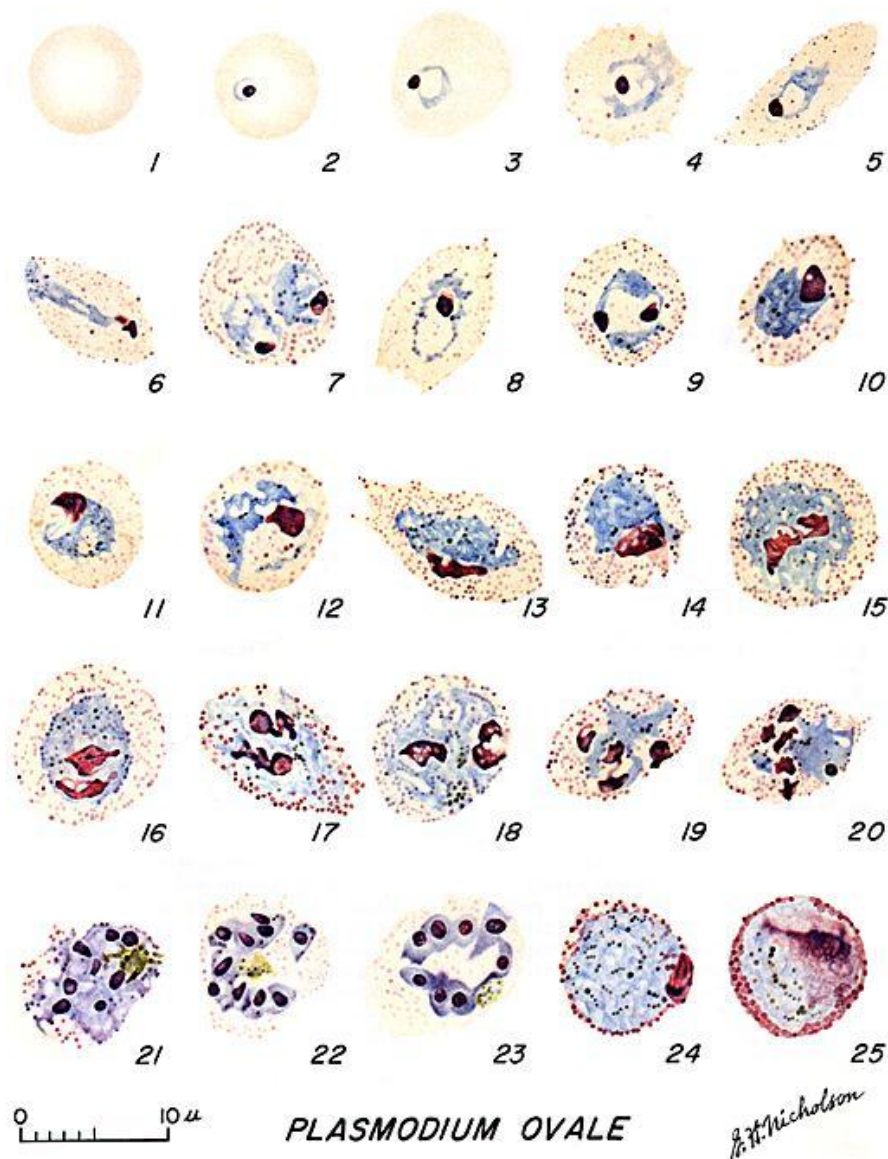
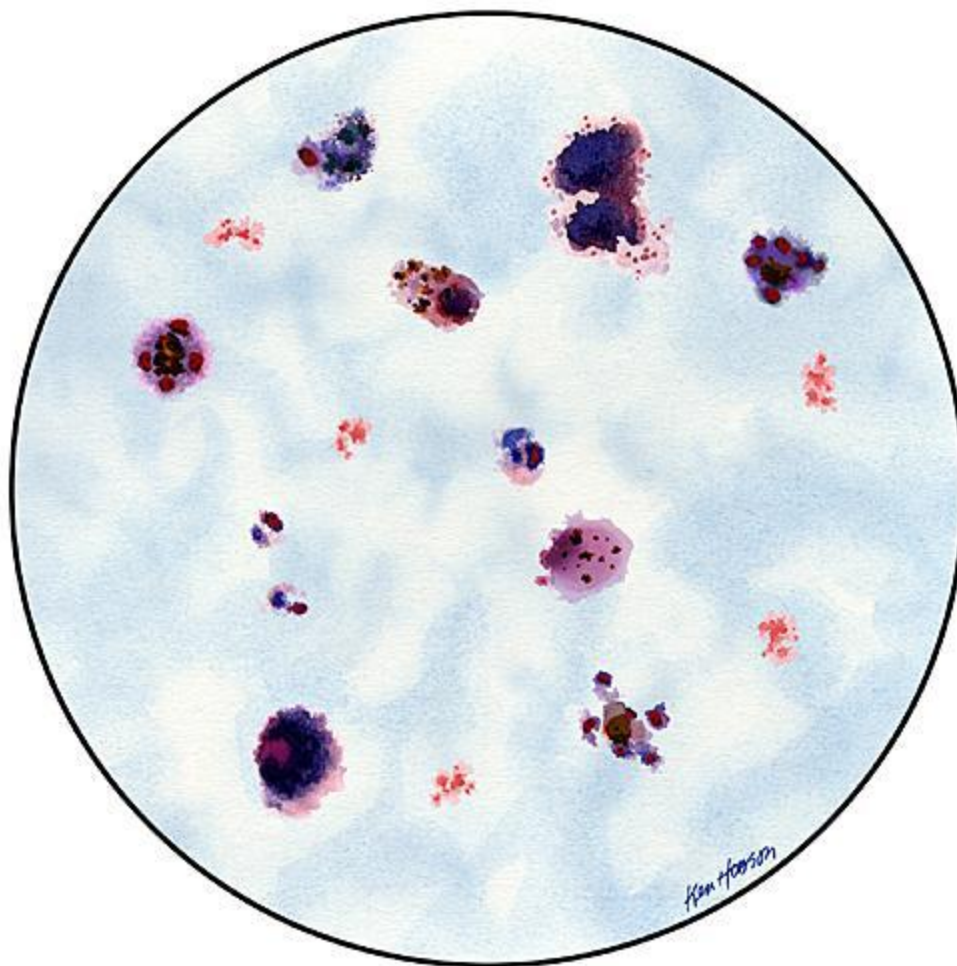


Fig. 1: Normal red cell; **Figs. 2-5:** Young trophozoites (Rings); **Figs. 6-15:** Trophozoites; **Figs. 16-23:** Schizonts; **Fig. 24:** Macrogametocytes (female); **Fig. 25:** Microgametocyte (male).

Thick Blood Smears



***Plasmodium ovale*: Ring Stage Parasites**

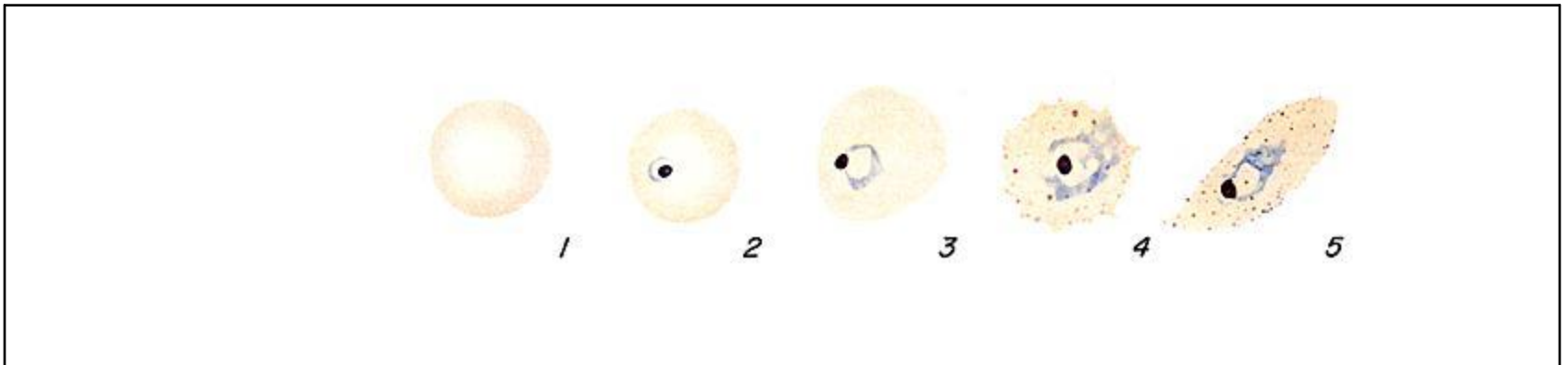
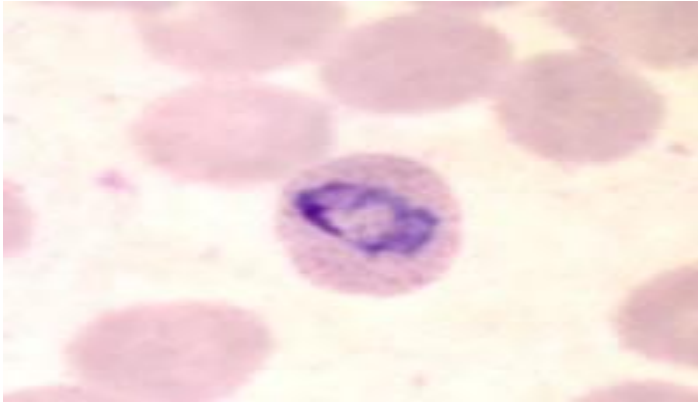


Fig. 1: Normal red cell; **Figs. 2-5:** Ring stage parasites.

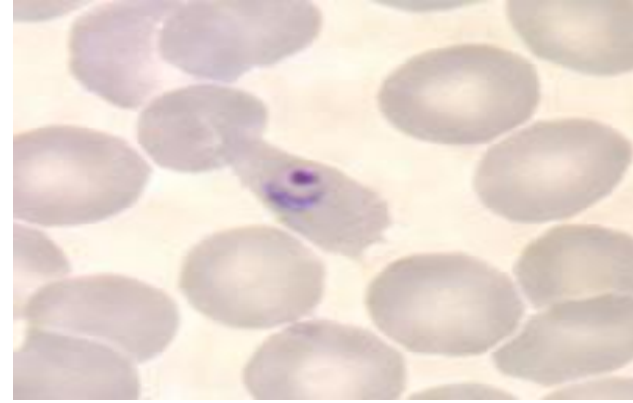
Plasmodium ovale: **Ring Stage Parasites**

Smears from patients:

Plasmodium ovale rings have sturdy cytoplasm and large chromatin dots. Red blood cells (RBCs) are normal to slightly enlarged (1 1/4 x) and fimbriated. Schüffner's dots are visible under optimal conditions.

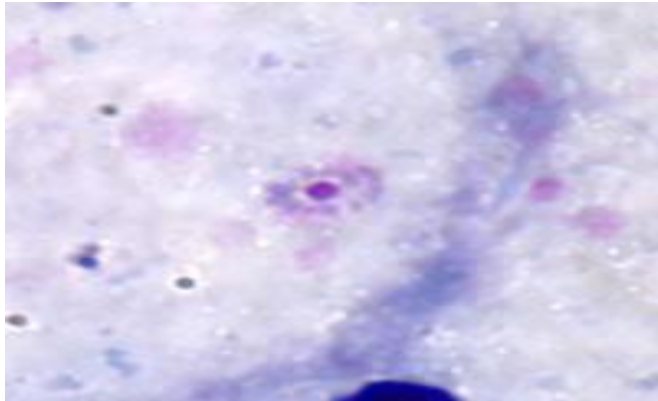


A

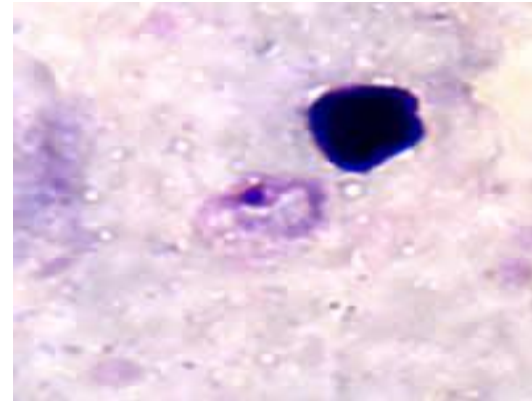


B

A, B: *P. ovale* rings in thin blood smears. **A** shows fimbriation of the infected RBC. **B** shows Schüffner's dots.



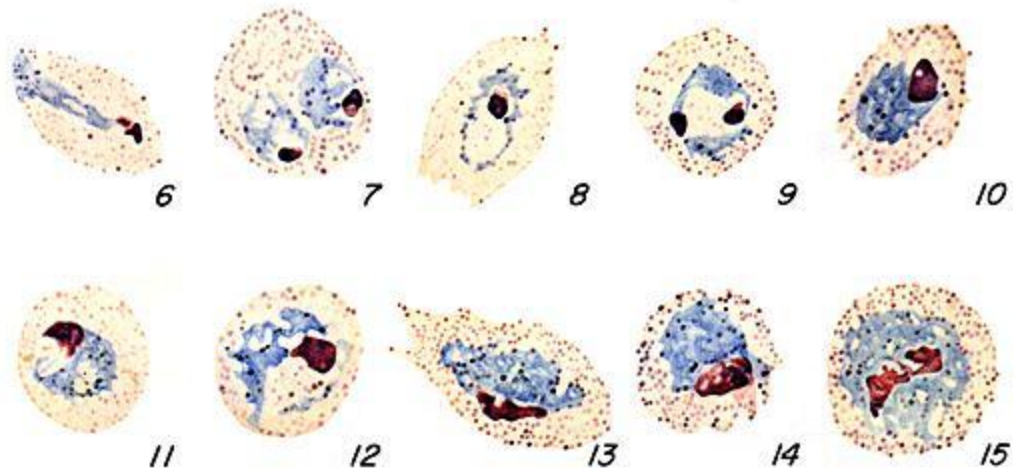
C



D

Plasmodium ovale: **Trophozoites**

Illustrations from: Coatney GR, Collins WE, Warren M, Contacos PG. The Primate Malarias. Bethesda: U.S. Department of Health, Education and Welfare; 1971.

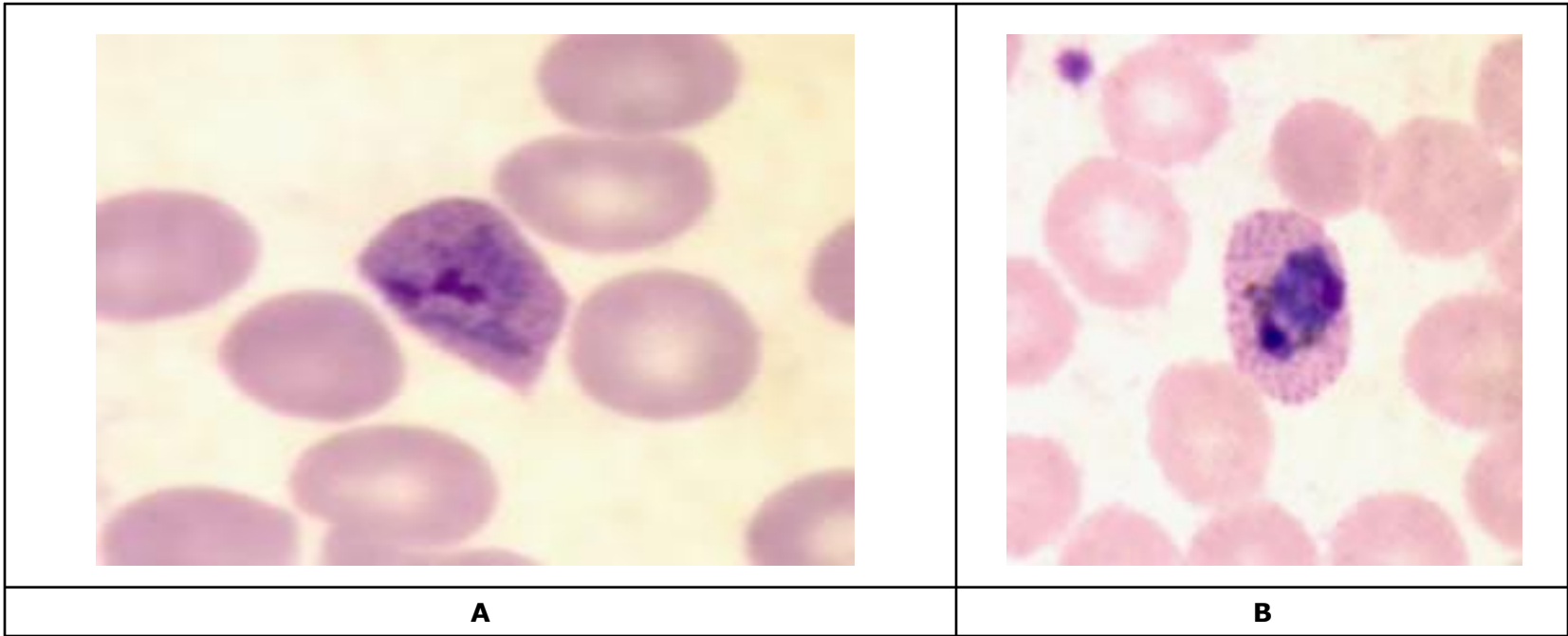


Increasingly mature trophozoites. Note the fimbriated red cells (**Figs. 8, 13**).

Plasmodium ovale: **Trophozoites**

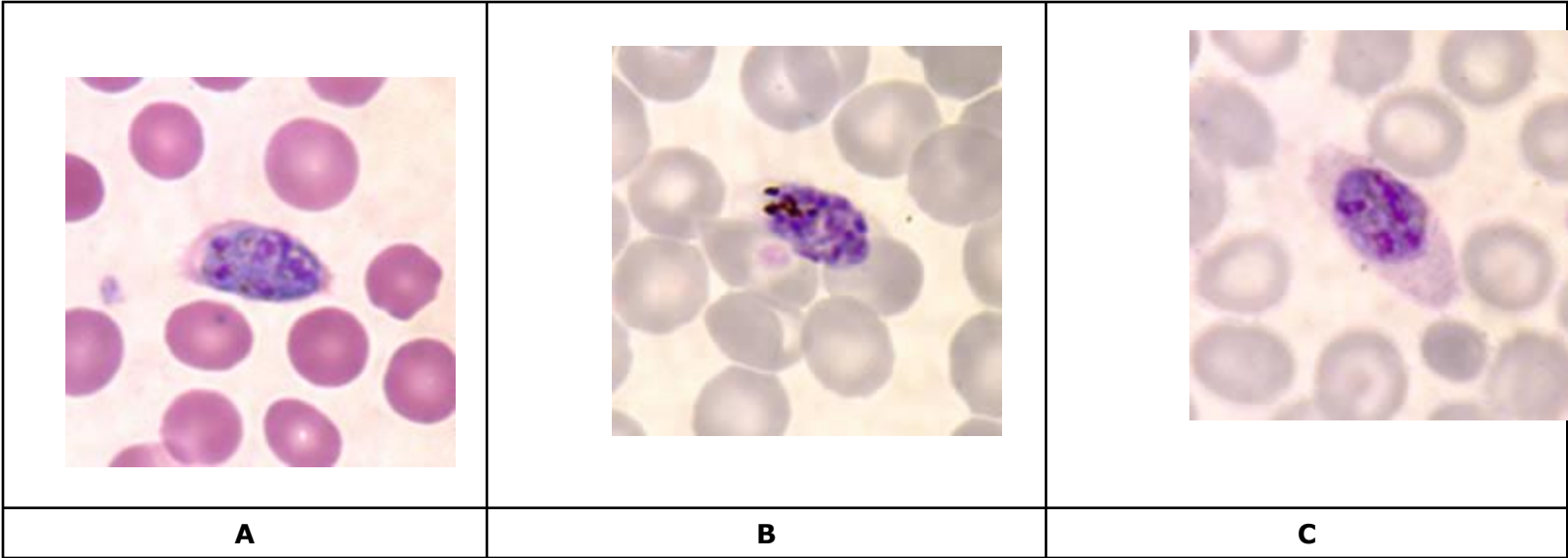
Smears from patients:

Plasmodium ovale trophozoites have sturdy cytoplasm, large chromatin dots, and can be compact to slightly amoeboid. Red blood cells (RBCs) are normal to slightly enlarged ($1\frac{1}{4} \times$), may be round to oval, and are sometimes fimbriated. Schüffner's dots are visible under optimal conditions.



A, B: Trophozoites of *P. ovale* in thin blood smears. **A** is slightly amoeboid. **B** shows a more compact trophozoite and Schüffner's dots.

Plasmodium ovale schizonts have 6 to 14 merozoites with large nuclei, clustered around mass of dark-brown pigment. Red blood cells (RBCs) are normal to slightly enlarged ($1\frac{1}{4}\times$), may be round to oval, and are sometimes fimbriated. Schüffner's dots are visible under optimal conditions.

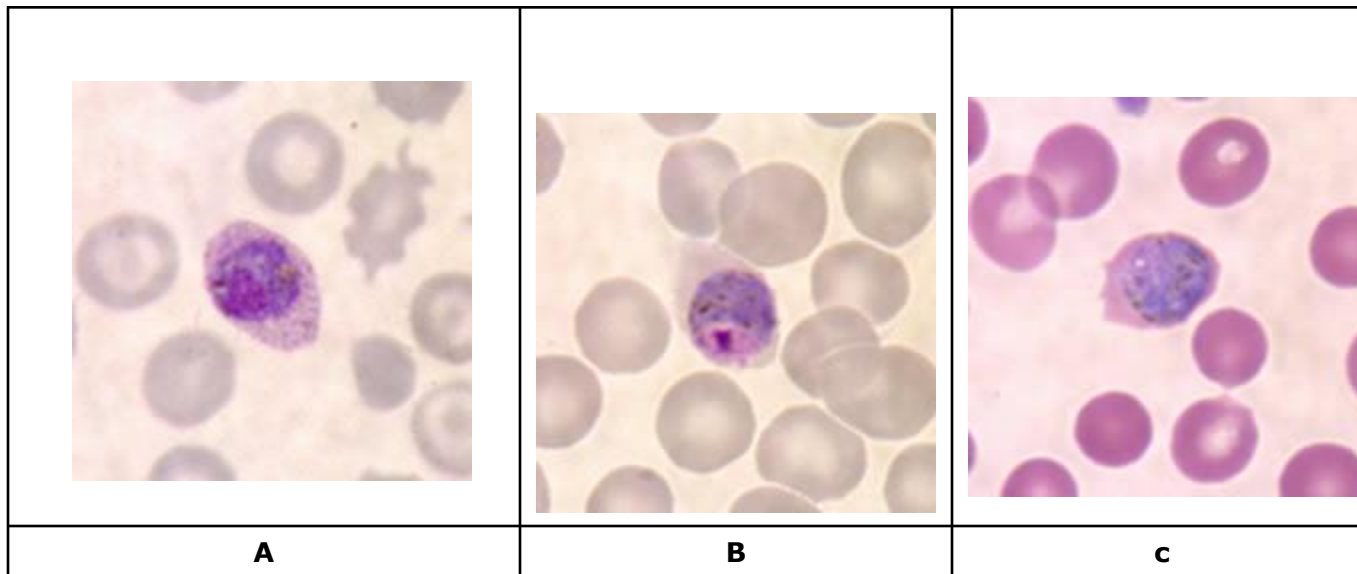


A, B, C: Schizonts of *P. ovale* in thin blood smears. All of these infected blood cells are oval. **A** and **C** have minor fimbriation.

***Plasmodium ovale*: Gametocytes**

Smears from patients:

Plasmodium ovale gametocytes are round to oval, and may almost fill the red blood cells (RBCs). Pigment is brown and more coarse than that of *P. vivax*. RBCs are normal to slightly enlarged ($1\frac{1}{4}\times$), may be round to oval, and are sometimes fimbriated. Schüffner's dots are visible under optimal conditions.



A, B, C: Gametocytes in thin blood smears. The Schüffner's dots can be seen in the infected oval RBC in **A**, and the erythrocytes in **B** and **C** show fimbriation.

Thin Blood Smears

Plasmodium vivax

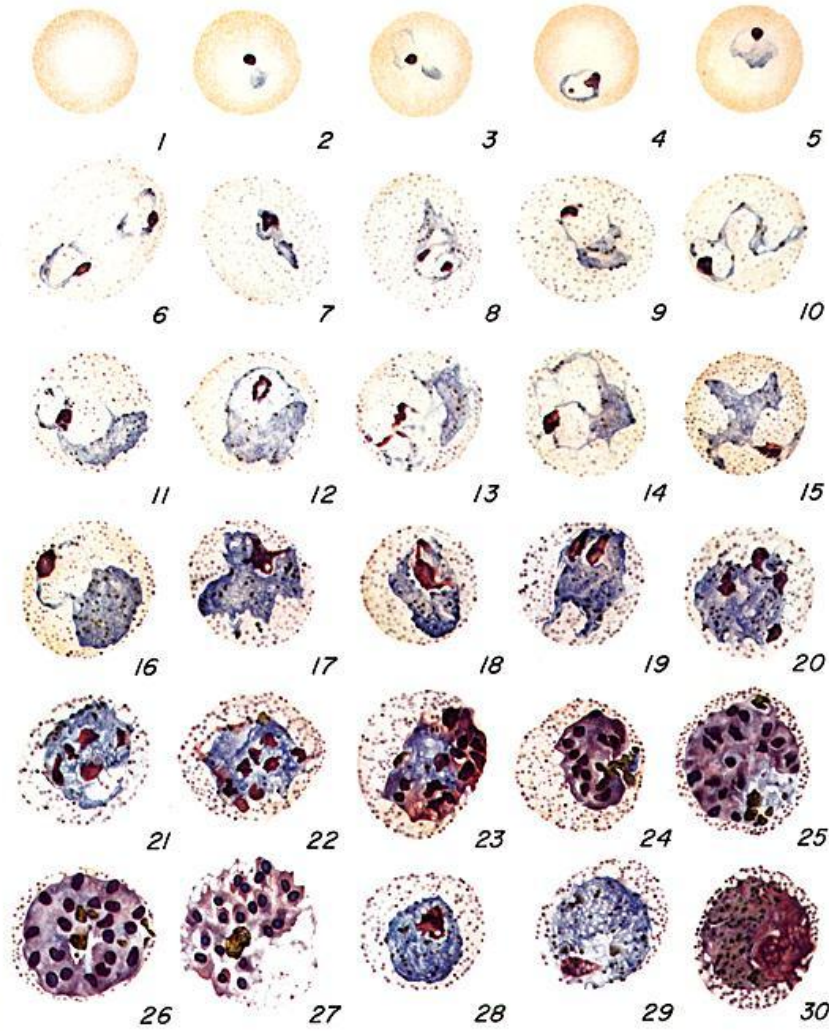


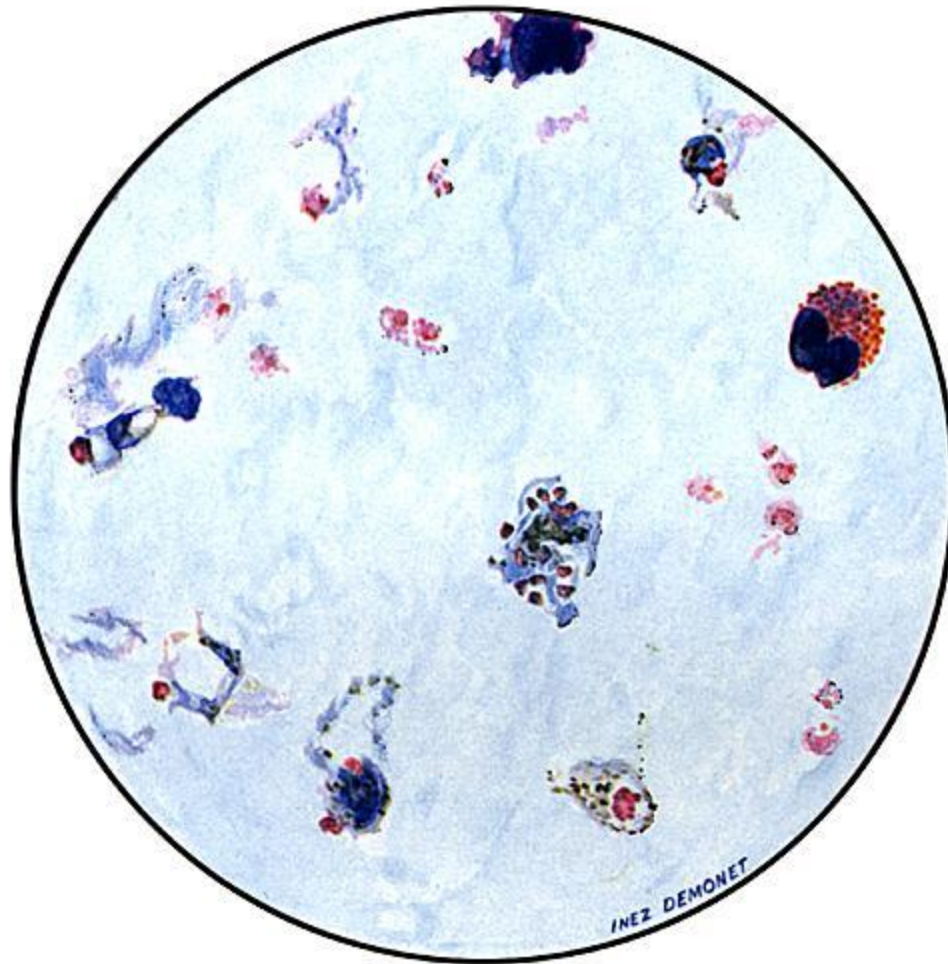
Fig. 1: Normal red cell; **Figs. 2-6:** Young trophozoites (ring stage parasites); **Figs. 7-18:** Trophozoites; **Figs. 19-27:** Schizonts; **Figs. 28 and 29:** Macrogametocytes (female); **Fig. 30:** Microgametocyte (male).

0 10 μ

PLASMODIUM VIVAX

H. H. Nicholson

Thick Blood Smears



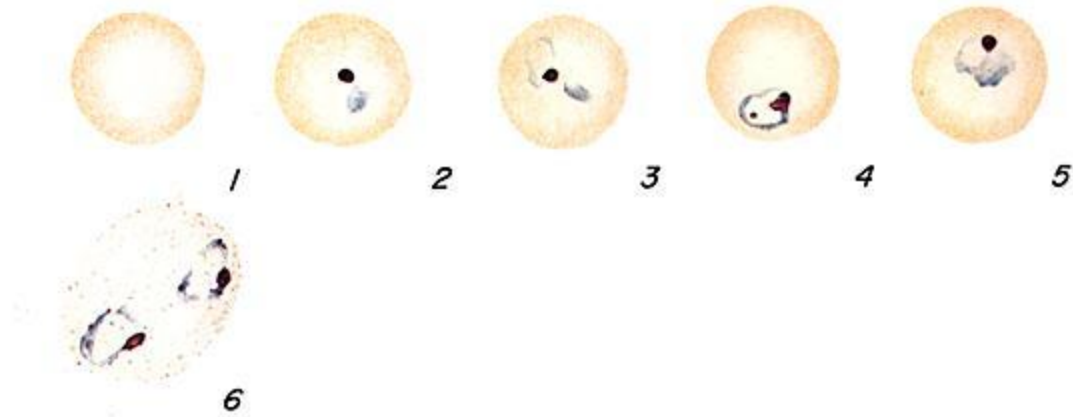
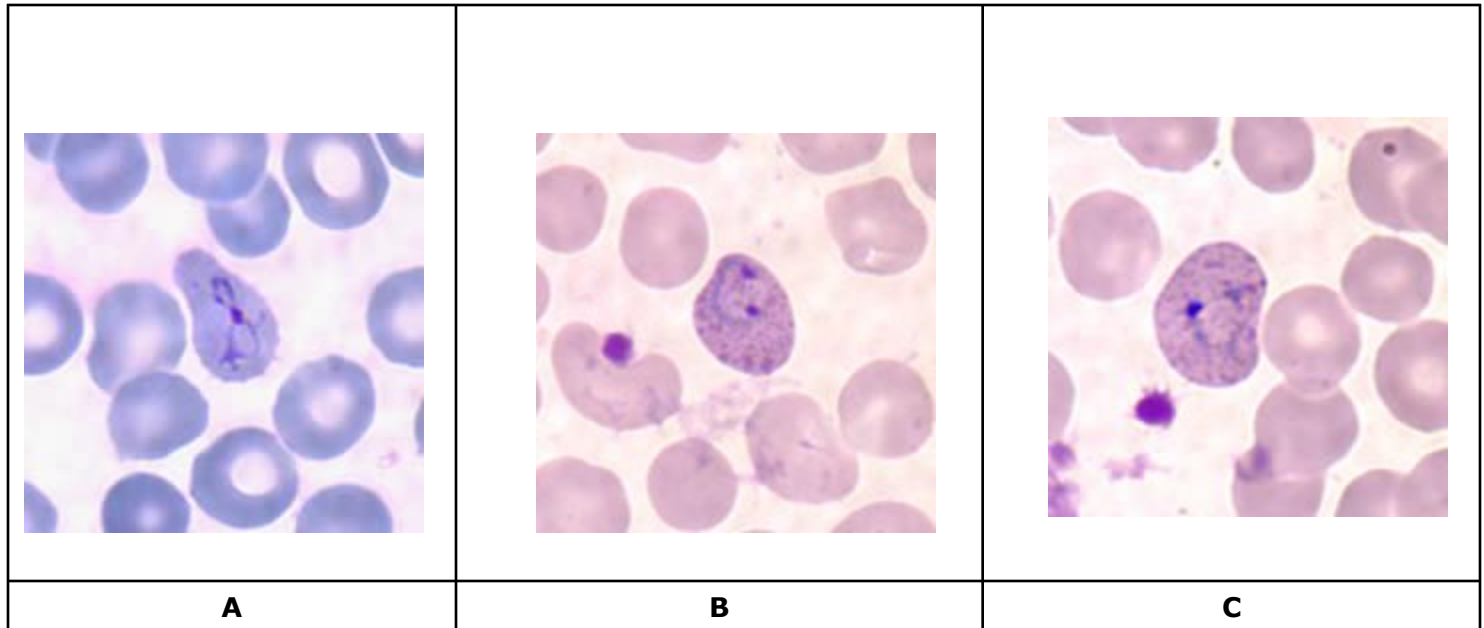


Fig. 1: Normal red cell; **Figs. 2-6:** Ring stage parasites (young trophozoites).

Plasmodium vivax: **Ring Stage Parasites**

Smears from patients:

Plasmodium vivax rings have large chromatin dots and can show amoeboid cytoplasm as they develop. Red blood cells (RBCs) can be normal to enlarged up to 1 1/2 × and may be distorted. Under optimal conditions, Schüffner's dots may be seen.



A, B, C: Rings in thin blood smears. **A** and **C:** Rings are amoeboid and the RBCs are enlarged and distorted. **B:** Ring with double chromatin dot. Schüffner's dots can be seen in **B** and **C**.

Plasmodium vivax: **Gametocytes**

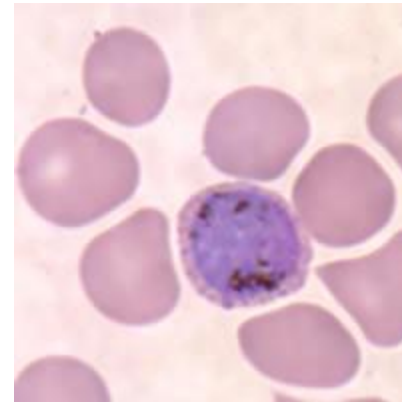
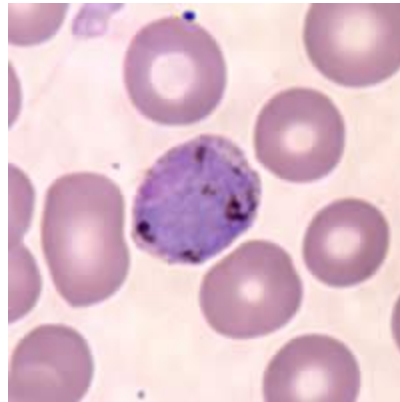
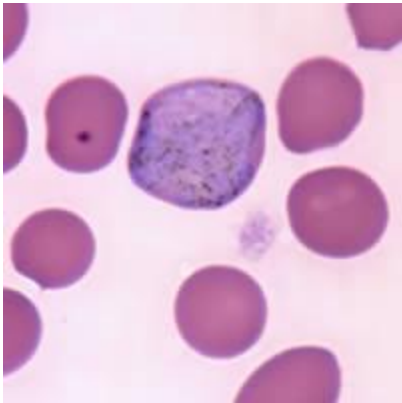


Fig. 28 and **29**: Nearly mature and mature macrogametocyte (fema); **Fig. 30**: leMicrogametocyte (male).

Plasmodium vivax: **Gametocytes**

Smears from patients:

Plasmodium vivax gametocytes are round to oval with scattered brown pigment and may almost fill the red blood cell (RBC). RBCs are enlarged $1\frac{1}{2}$ to $2\times$ and may be distorted. Under optimal conditions, Schüffner's dots may appear more fine than those seen in *P. ovale*.

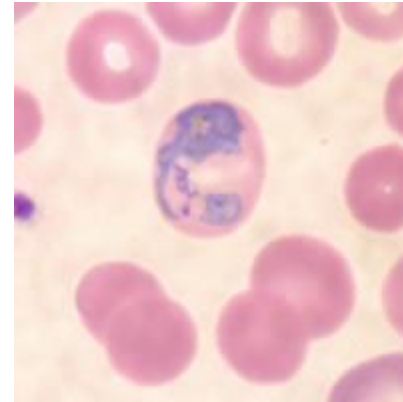
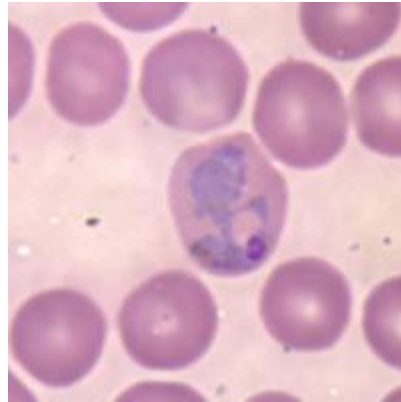
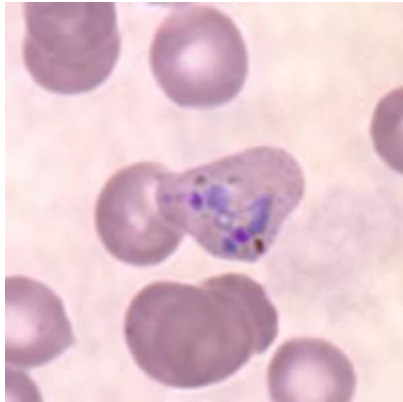


A, B, C: Gametocytes of *P. vivax* in thin blood smears. Schüffner's dots can be seen in **B** and **C**.

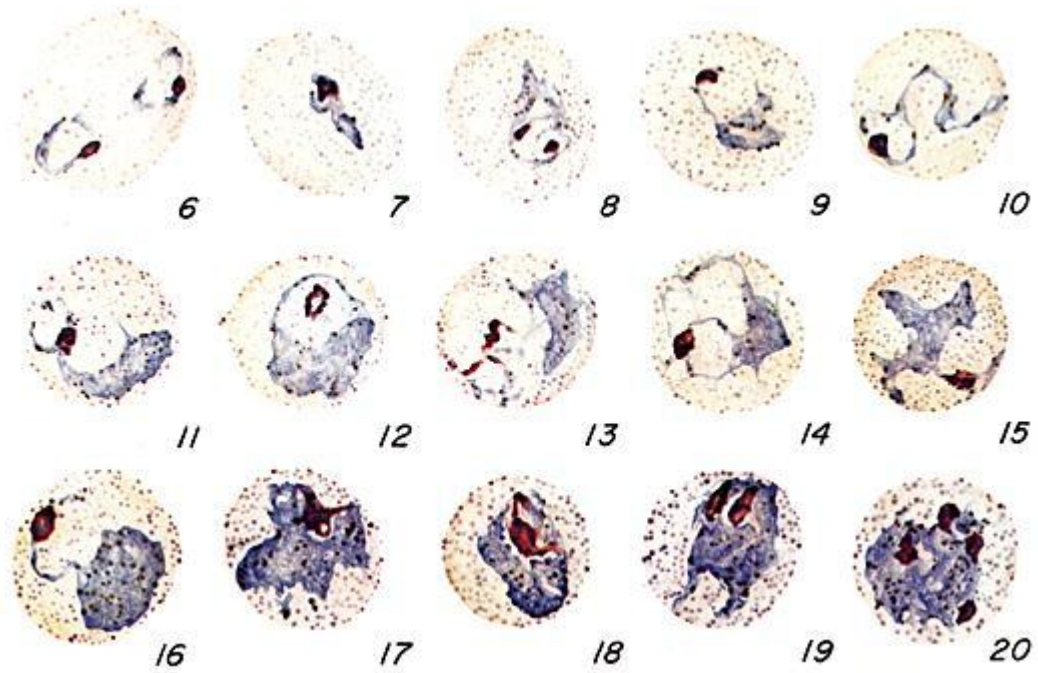
Plasmodium vivax: Trophozoites

Smears from patients:

Plasmodium vivax trophozoites show amoeboid cytoplasm, large chromatin dots, and have fine, yellowish-brown pigment. Red blood cells are enlarged $1\frac{1}{2}$ to $2\times$ and may be distorted. Under optimal conditions, Schüffner's dots may appear more fine than those seen in *P. ovale*.



***Plasmodium vivax*: Trophozoite.**



Figs. 8-18: Increasingly mature trophozoites of *P. vivax*.

***Sarcoptes scabiei* mites**

Adult females of *Sarcoptes scabiei* mites are 300-450 μm long by 250-350 μm wide; males are smaller at 200-240 μm long by 150-200 μm wide. Adults live in the skin and are usually found in skin scrapings.



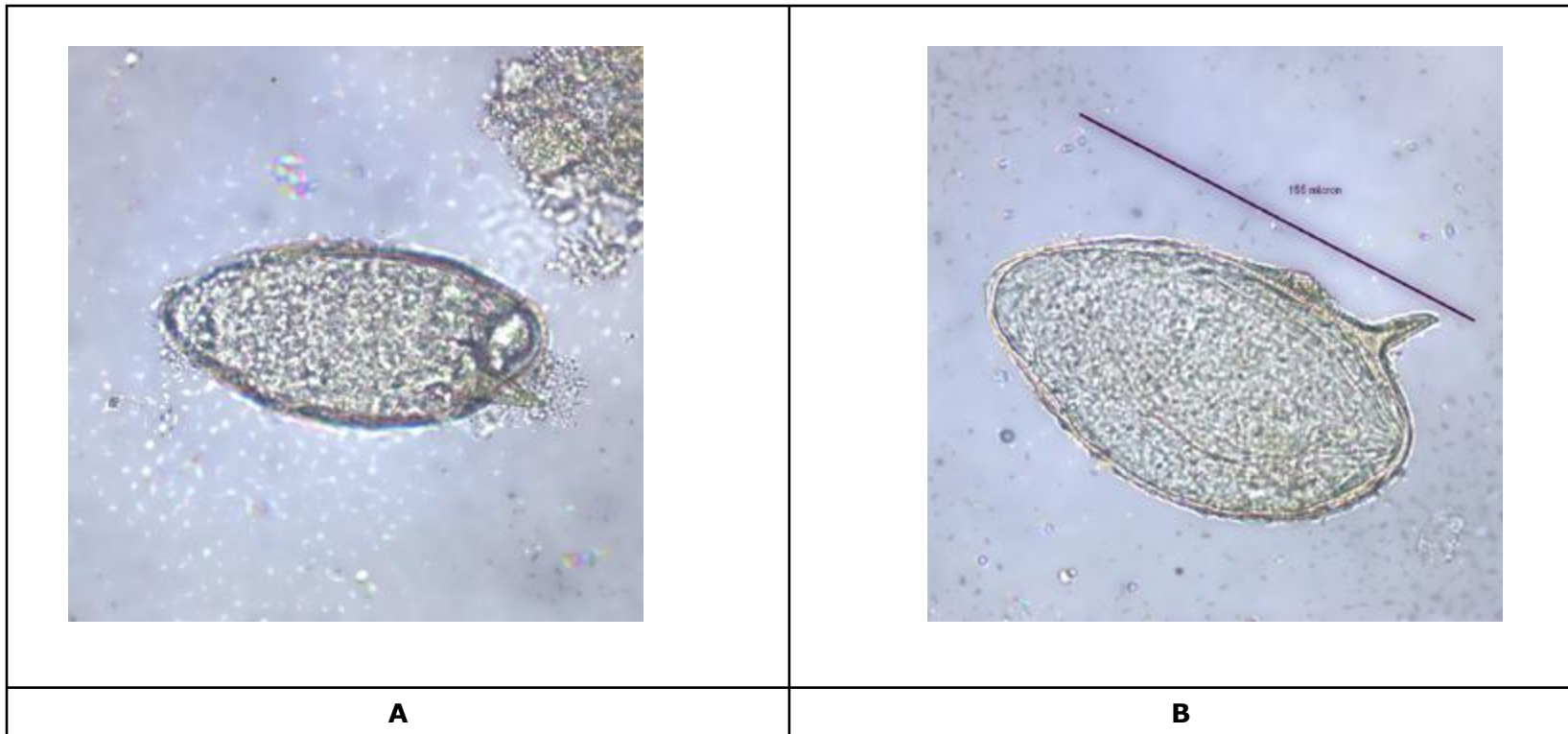
Scabies caused by *Sarcoptes scabiei* burrowing under the skin



Scabies lesions are caused by *Sarcoptes scabiei* burrowing under the skin. A typical location is on the hands, particularly the webbing between the fingers, as shown in this image.

Schistosomiasis

Schistosoma mansoni eggs are large (114 to 180 μm long by 45-70 μm wide) and have a characteristic shape, with a prominent lateral spine near the posterior end. The anterior end is tapered and slightly curved. When the eggs are excreted in stool, they contain a mature miracidium.



A, B: Eggs of *S. mansoni* in unstained wet mounts. Images courtesy of the Wisconsin State Laboratory of Hygiene.

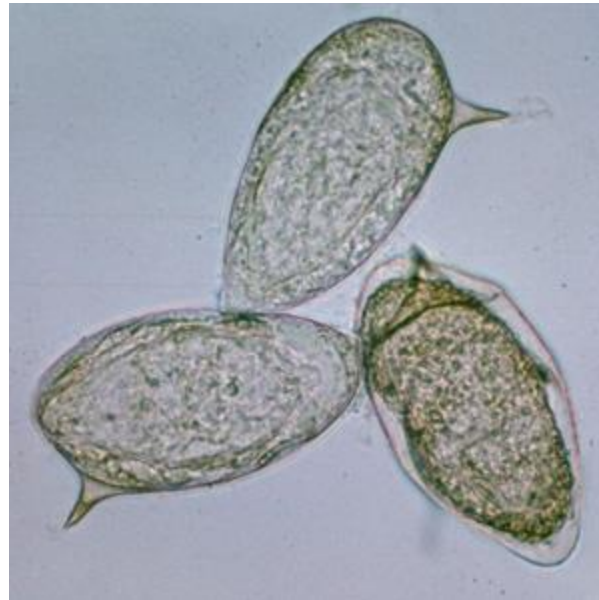


C



D

C, D: Eggs of *S. mansoni* in unstained wet mounts. Images courtesy of the Missouri State Public Health Laboratory.



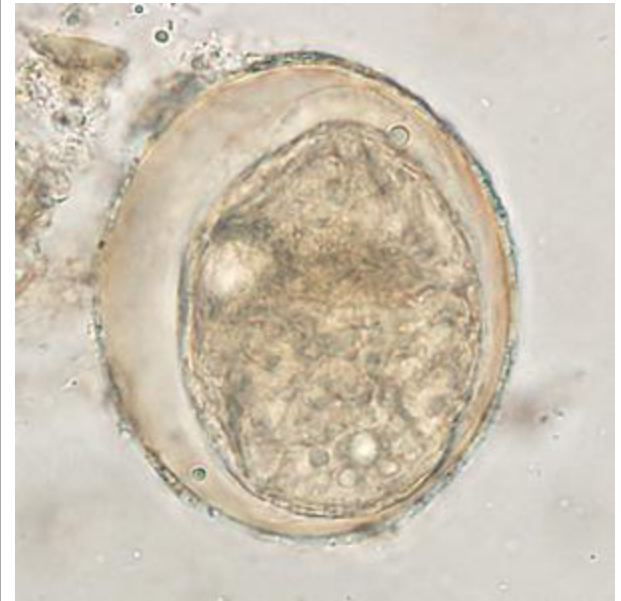
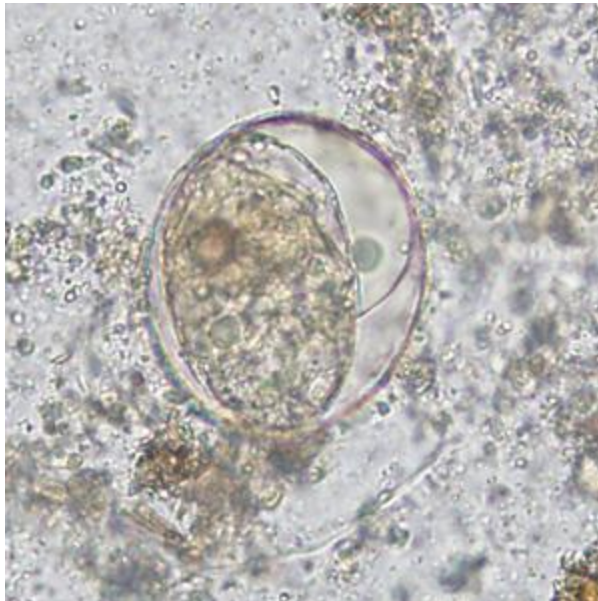


A

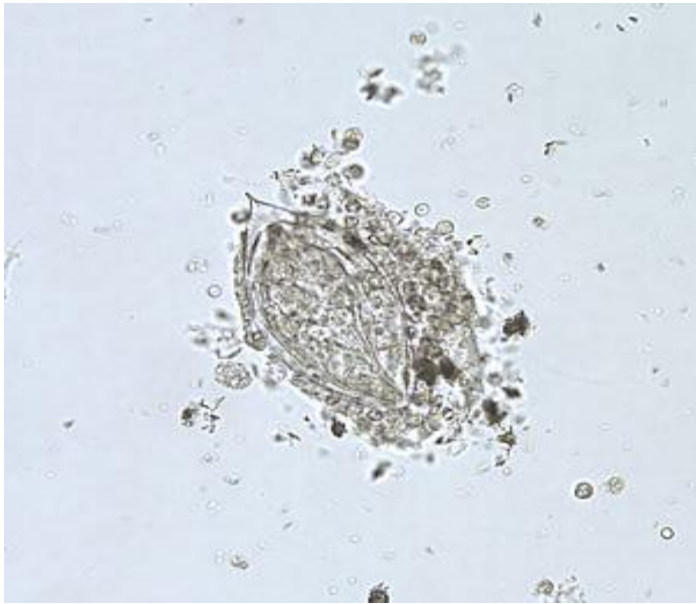


B

A, B Eggs of *S. japonicum* in unstained wet mounts. Note the small, inconspicuous spines (red arrows).



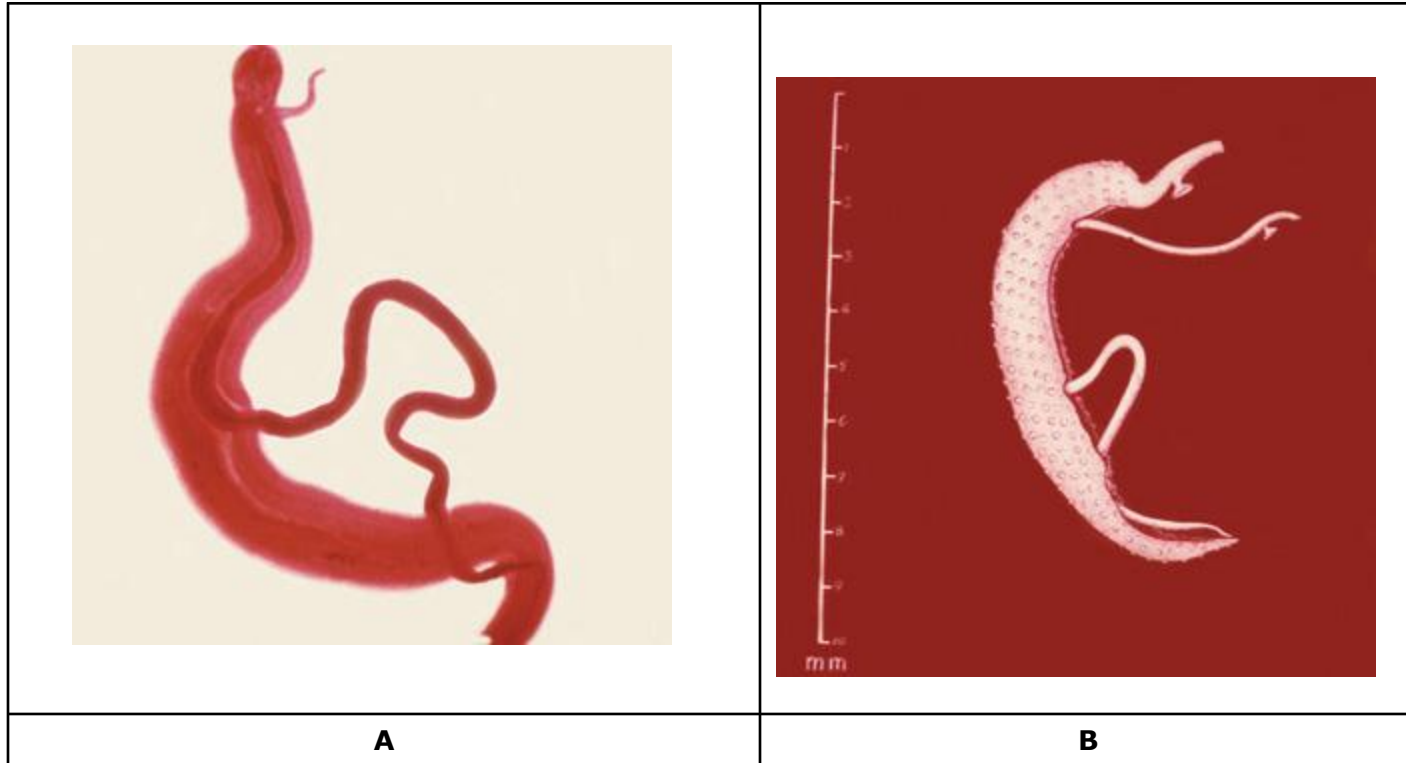
C, D: Eggs of *S. japonicum* in an unstained wet mount of stool. The spine is not visible in either of these specimens.



A, B: Eggs of *S. haematobium* in wet mounts of urine concentrates, showing the characteristic terminal spine.

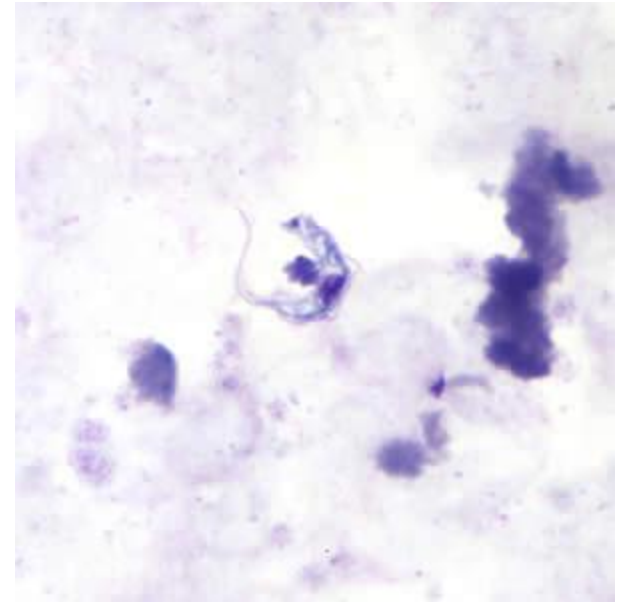
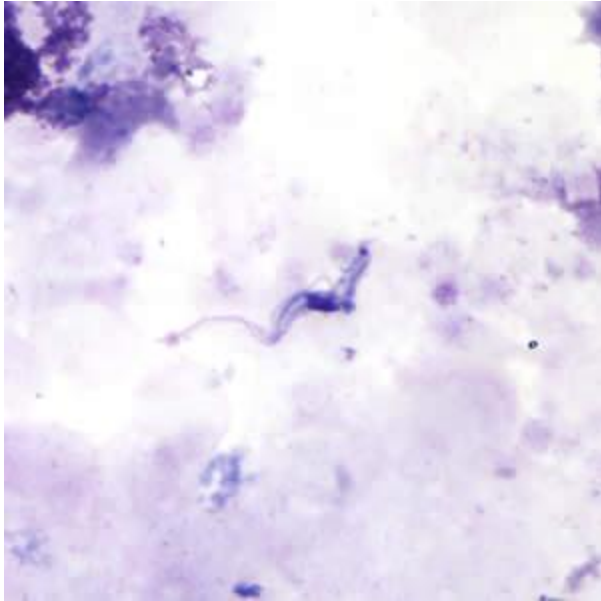


Adults of *Schistosoma mansoni*. Unlike the flukes, adult schistosomes have the sexes separate, with the female residing in a gynecophoral canal within the male. Male worms are robust, tuberculate and measure 6-12 mm in length. Females are longer (7-17 mm in length) and slender. Adult *S. mansoni* reside in the venous plexuses of the colon and lower ileum and in the portal system of the liver of their host.

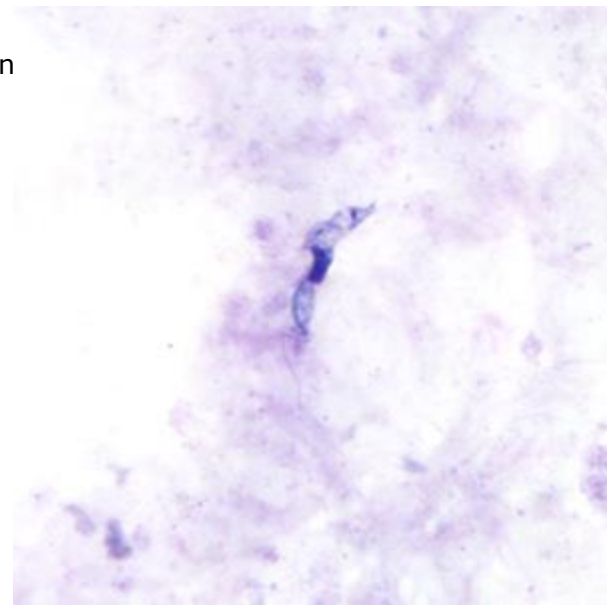


A, B: Adults of *S. mansoni*. The thin female resides in the gynecophoral canal of the thicker male. Note the tuberculate exterior of the male in Figure **B**.

Trypanosomes

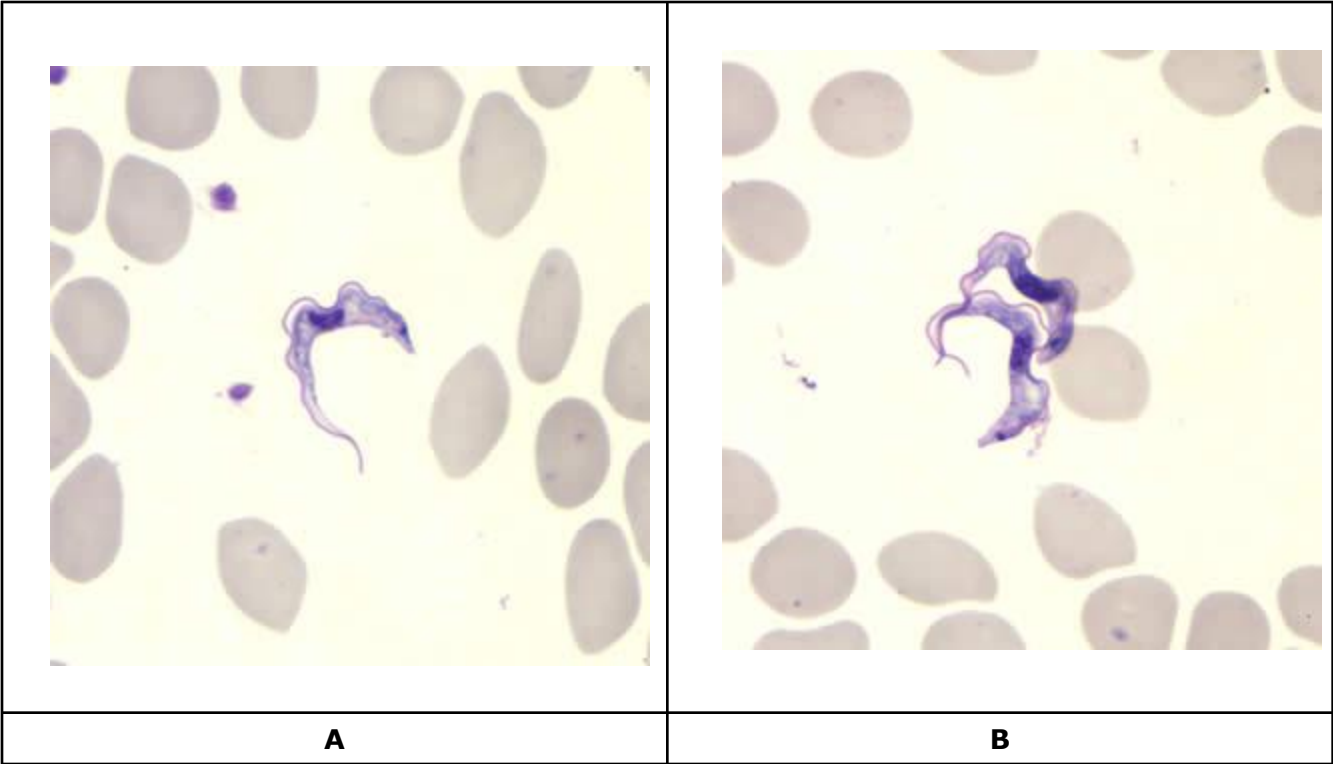


A, B: *Trypanosoma brucei* sp. in thick blood smears stain



C: *Trypanosoma brucei* sp. in thick blood smears stained with Giemsa.

The two *Trypanosoma brucei* species that cause African trypanosomiasis, *T. b. gambiense* and *T. b. rhodesiense*, are indistinguishable morphologically. A typical trypomastigote has a small kinetoplast located at the posterior end, a centrally located nucleus, an undulating membrane, and a flagellum running along the undulating membrane, leaving the body at the anterior end. Trypomastigotes are the only stage found in patients. Trypanosomes range in length from 14 to 33 μm .

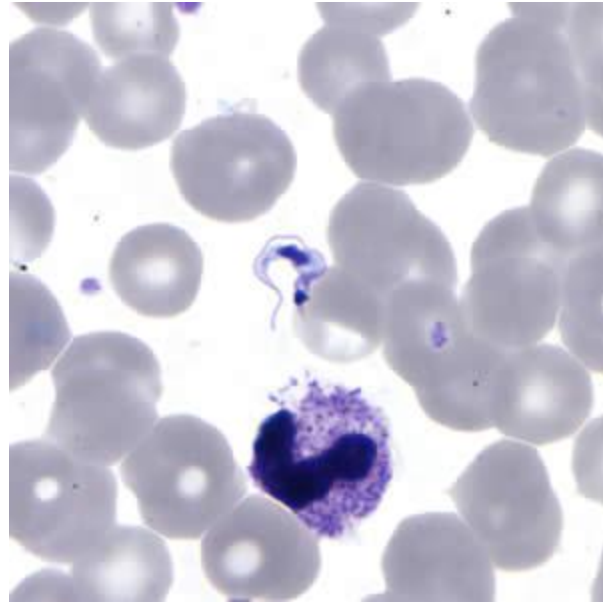


A, B: *Trypanosoma brucei* sp. in thin blood smears stained with Giemsa.

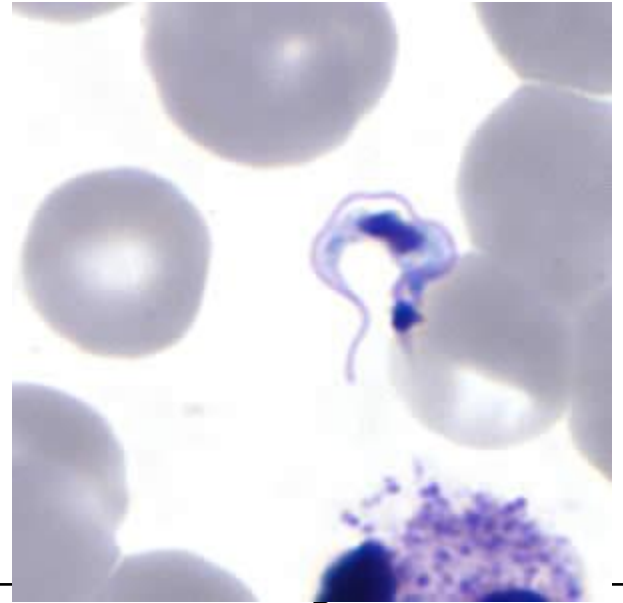
Trypanosomiasis, American

A: *T. cruzi* trypomastigote in a thin blood smear stained with Giemsa. Note the typical C-shape of the trypomastigote that characterizes *T. cruzi* in fixed blood smears.

B: Three *T. cruzi* trypomastigotes in a thin blood smear stained with Giemsa.



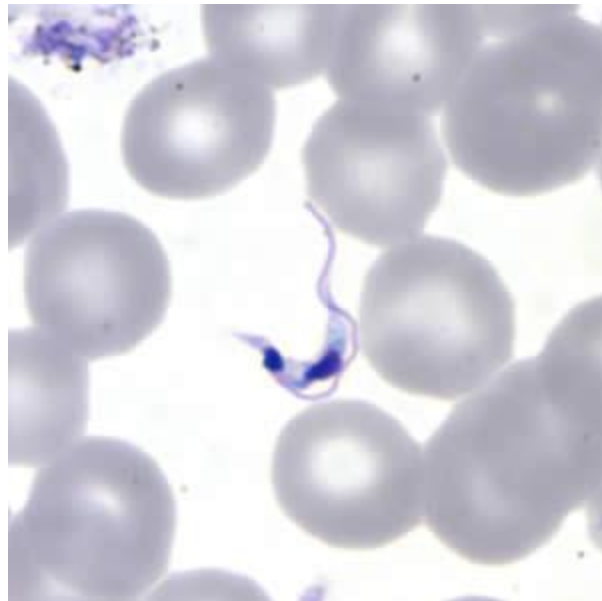
C



D

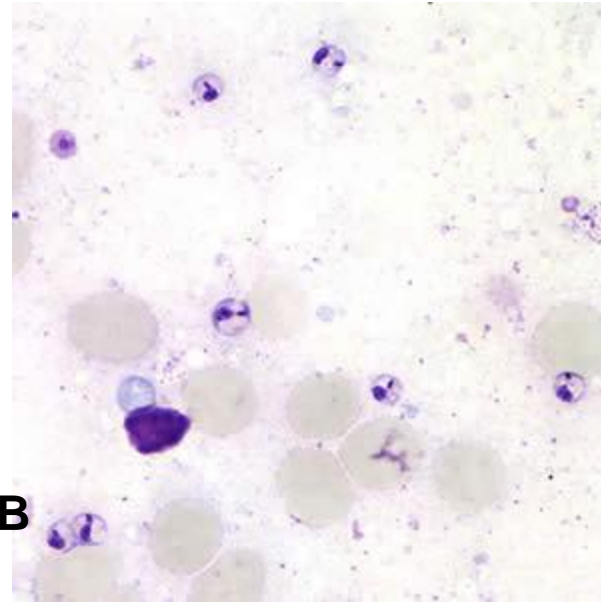
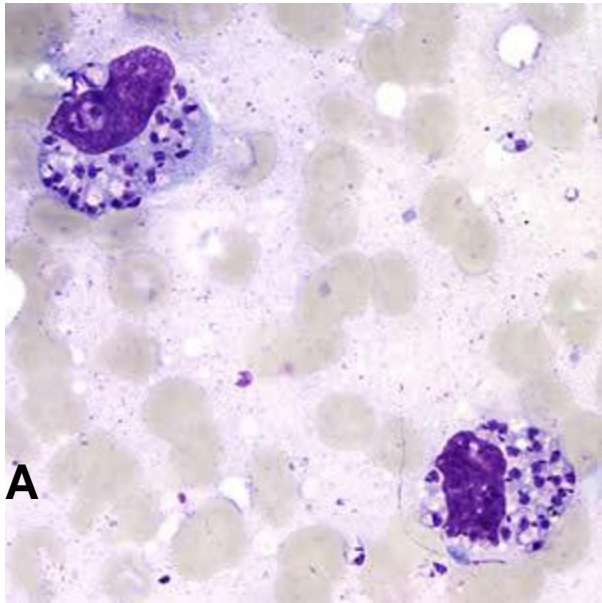
C: *T. cruzi* trypomastigote in a thin blood smear stained with Giemsa.

D: Higher magnification of Figure **C**, *T. cruzi*.



E: *T. cruzi* trypomastigote in a thin blood smear stained with Giemsa. Note the kinetoplast is subterminal.

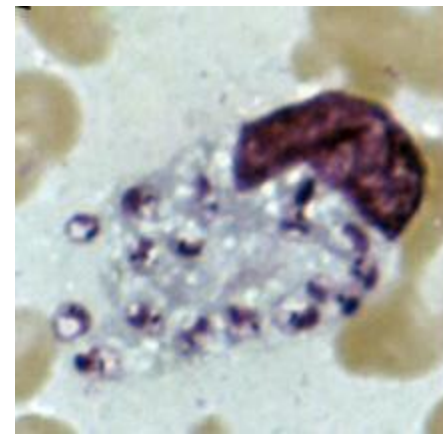
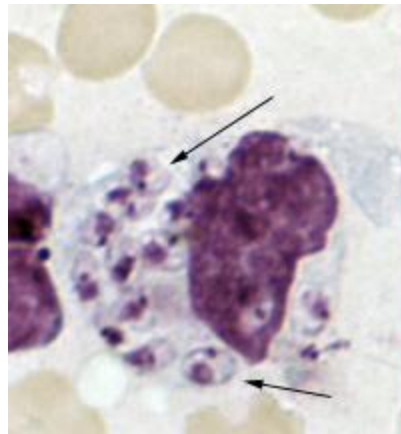
Amastigotes of *Leishmania* are spherical to ovoid and measure 1-5 μm long by 1-2 μm wide. They possess a large nucleus, a prominent kinetoplast, and a short axoneme, the last of which is rarely visible by light microscopy. The organisms reside in macrophages of the host and can be found throughout the body.



A, B: *Leishmania* spp. amastigotes; touch-prep stained with Giemsa.

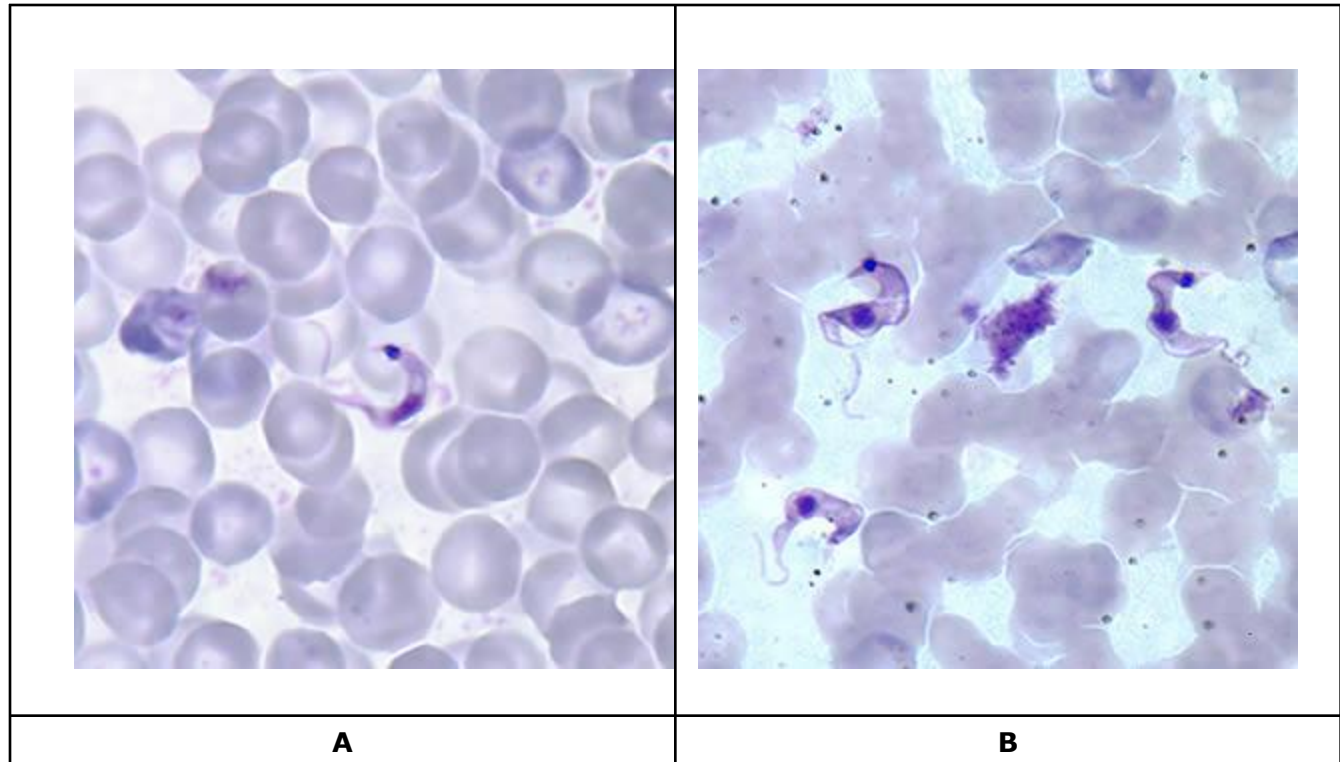
A: *Leishmania* spp. amastigotes in a Giemsa-stained tissue scraping.

B: *Leishmania (Viannia) panamensis* amastigotes in a Giemsa-stained tissue scraping. Identification to the species level is not possible based on morphology and other diagnostic techniques such as isoenzyme assay or PCR are needed.



Trypanosomiasis, American

Trypanosoma cruzi trypomastigotes are the only stage found in the blood of an infected person. Motile circulating trypomastigotes are readily seen on slides of fresh anticoagulated blood in acute infection but are rarely detectable by microscopy in chronic *T. cruzi* infection. A typical trypomastigote has a large, subterminal or terminal kinetoplast, a centrally located nucleus, an undulating membrane, and a flagellum running along the undulating membrane, leaving the body at the anterior end. Trypanosomes measure from 12 to 30 μm in length. Trypomastigotes may be seen in cerebrospinal fluid (CSF) in central nervous system infections; also the amastigote stage parasite may be seen in histopathology specimens from affected organs.



A: *T. cruzi* trypomastigote in a thin blood smear stained with Giemsa. Note the typical

Strongyloides stercoralis

The first-stage rhabditoid larvae (L1) of *Strongyloides stercoralis* are 180-380 μm long, with a short buccal canal, a rhabditoid esophagus and a prominent genital primordium. These L1 larvae are usually found in stool, as the eggs embryonate and hatch in the mucosa of the small intestine of the host. They may also be found in soil and cultured feces.



A



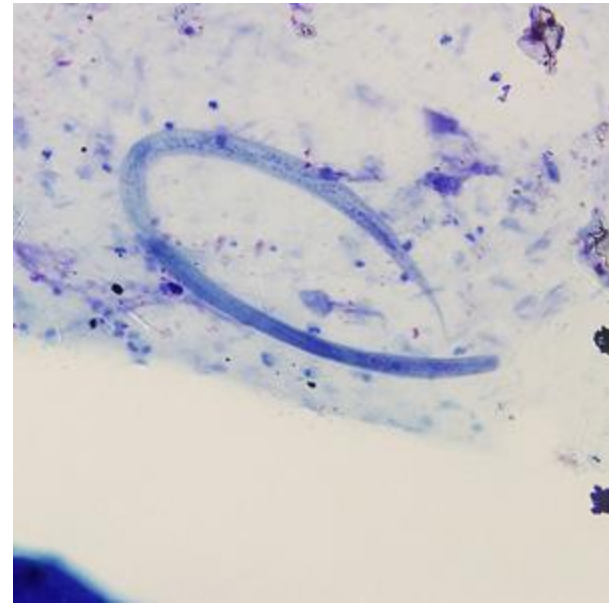
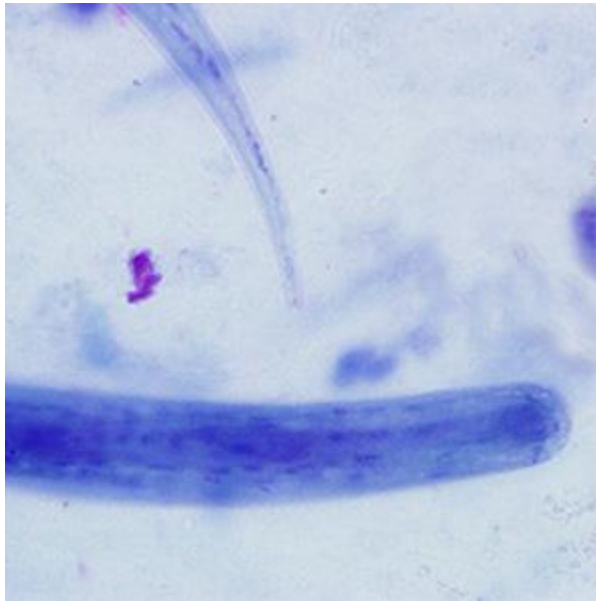
B

A, B: Rhabditoid larvae of *S. stercoralis* in unstained wet mounts of stool. Notice the short buccal canal and the genital primordium (red arrows).

A: Filariform (L3) larva of *S. stercoralis* in an unstained wet mount.



B: Filariform (L3) larva of *S. stercoralis* in a sputum specimen, stained with Giemsa. Image taken at 200x magnification.

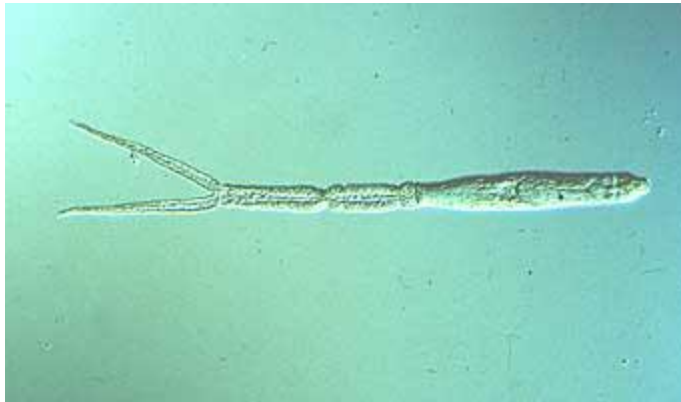


C: Higher magnification (1000x oil) of the worm in Figure B. Notice the notched tail.

Cercarial Dermatitis

Swimmer's itch

[Last Modified: 06/17/2008 17:19:30]



A



B

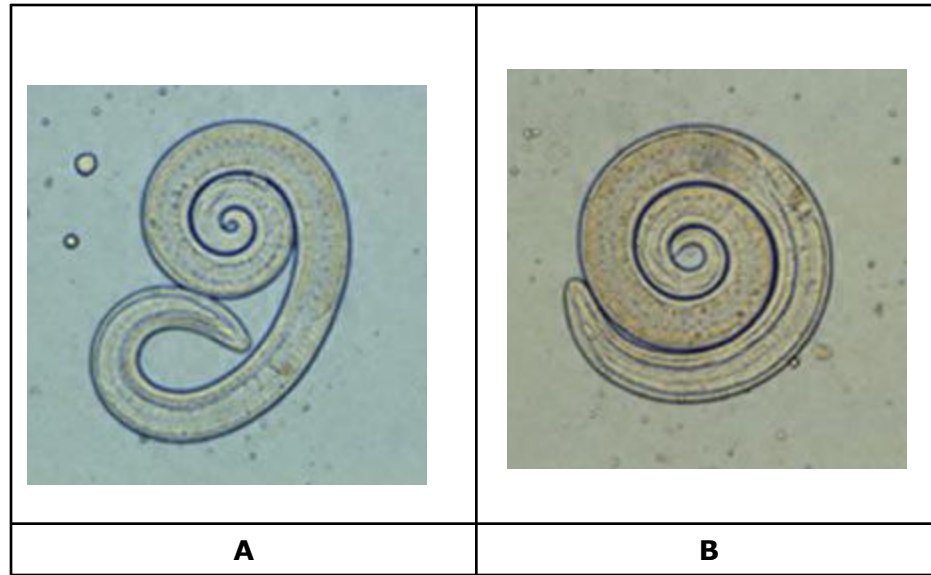
A, B: Two images showing one of the types of cercaria (*Austrobilharzia variglandis*) which can cause cercarial dermatitis. Diagnostic characteristics include the following:

1. Forked-tail
2. Presence of "eye-spots"

Proper identification of cercariae which may cause cercarial dermatitis is best left to investigators with a good background in trematode morphology as well as malacology.

Trichinella spp

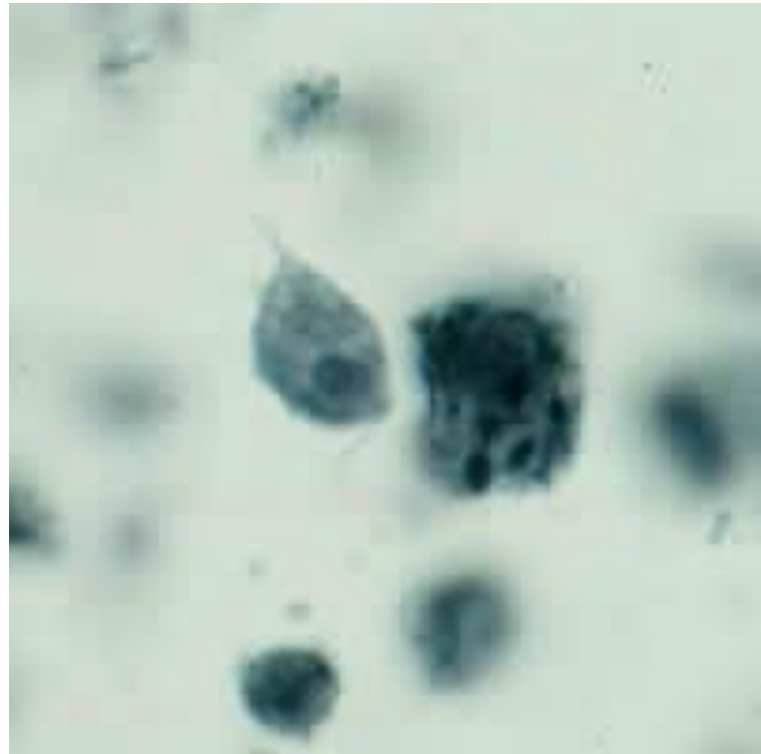
Adult *Trichinella* spp. reside in the intestinal tract of the mammalian host; larvae can be found encapsulated in muscle tissue. Diagnosis is usually made serologically or based on observation of the larvae in muscle tissue following biopsies or autopsies.



A, B: *Trichinella* larvae, freed from their cysts from the muscle tissue of an Alaskan bear.

Trichomoniasis

Trophozoites of *Trichomonas vaginalis* are pyriform and 7-30 μm long. They have five flagella: four anteriorly directed flagella and one posteriorly along the outer membrane of the undulating membrane. The large nucleus is usually located at the wider, anterior end and contains many chromatin granules and a small karyosome. The cytoplasm also contains many granules, but these are often not seen in Giemsa-stained specimens.

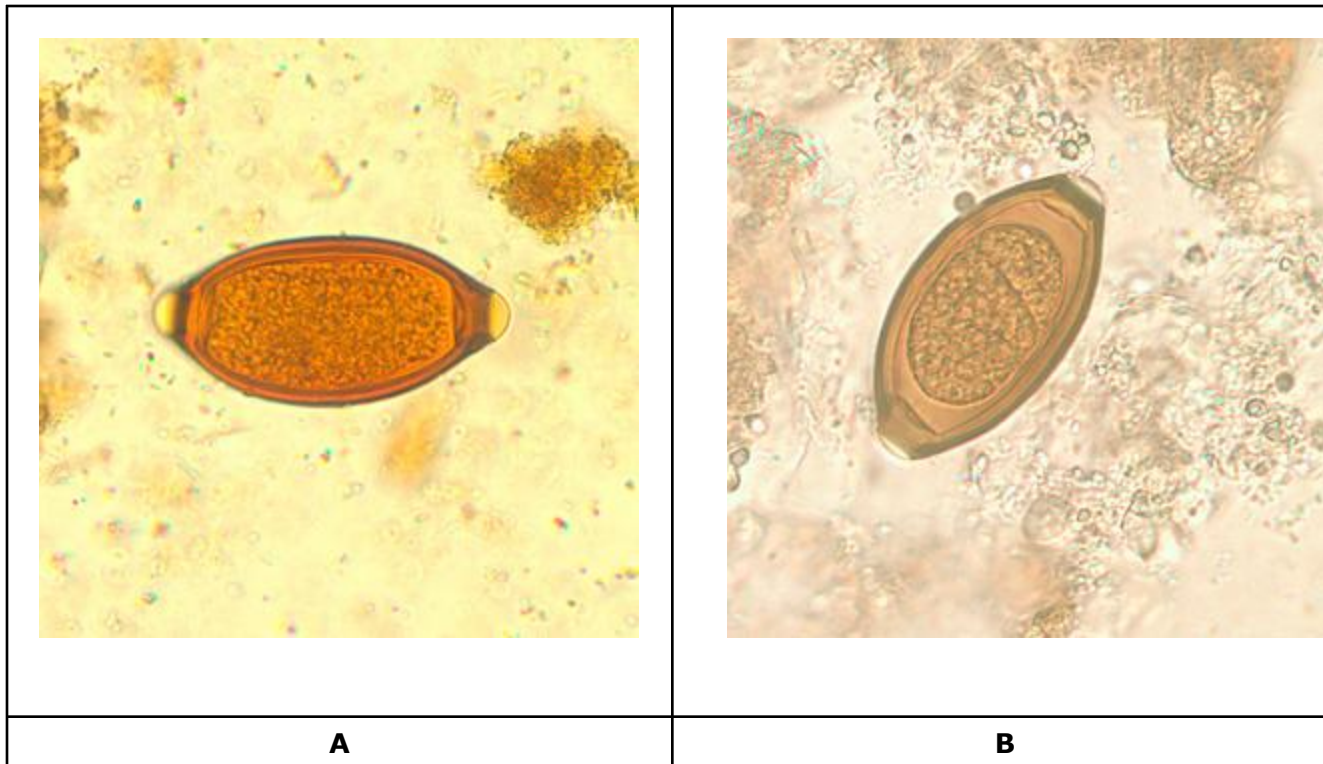


- A:** Two trophozoites of *T. vaginalis* obtained from in vitro culture, stained with Giemsa.
B: Trophozoite of *T. vaginalis* stained with iron hematoxylin.

Trichuriasis

[Last Modified: 06/17/2008 17:18:10]

Trichuris trichiura eggs are 50-55 micrometers by 20-25 micrometers. They are barrel-shaped, thick-shelled and possess a pair of polar "plugs" at each end. The eggs are unembryonated when passed in stool.

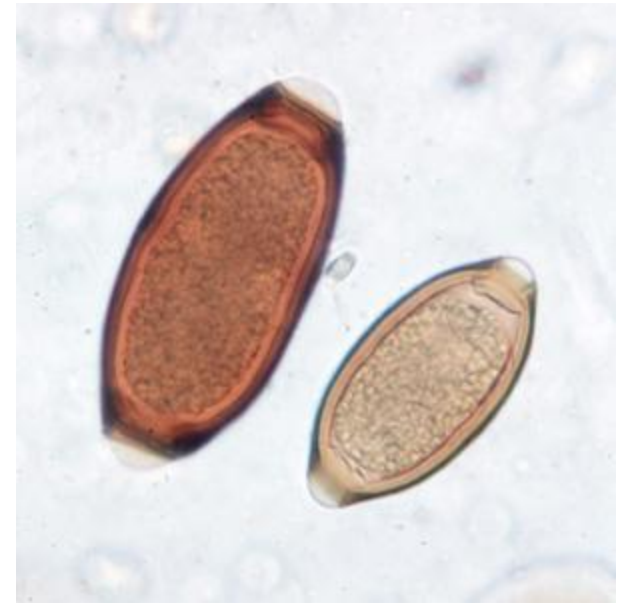


A: Egg of *T. trichiura* in an iodine-stained wet mount.

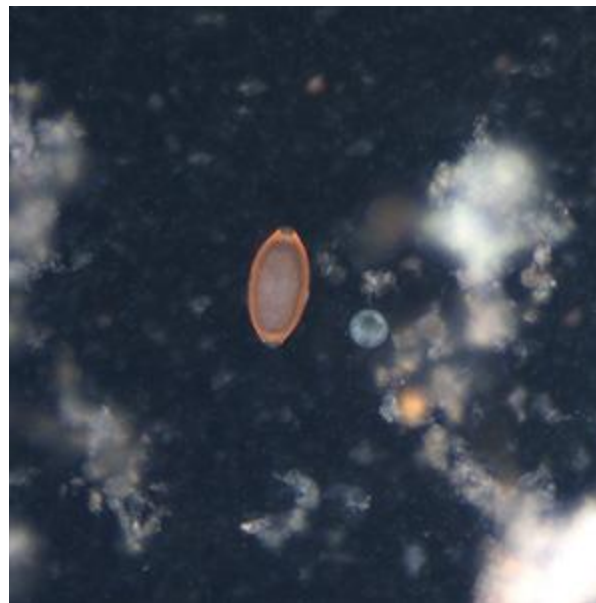
B: Egg of *T. trichiura* in an unstained wet mount.



C: Egg of *T. trichiura* in an unstained wet mount.



D: Eggs of *T. trichiura* in a wet mount, showing variability in size in the species.



E: Egg of *T. trichiura* viewed with UV microscopy.

Megaloblastic anaemia

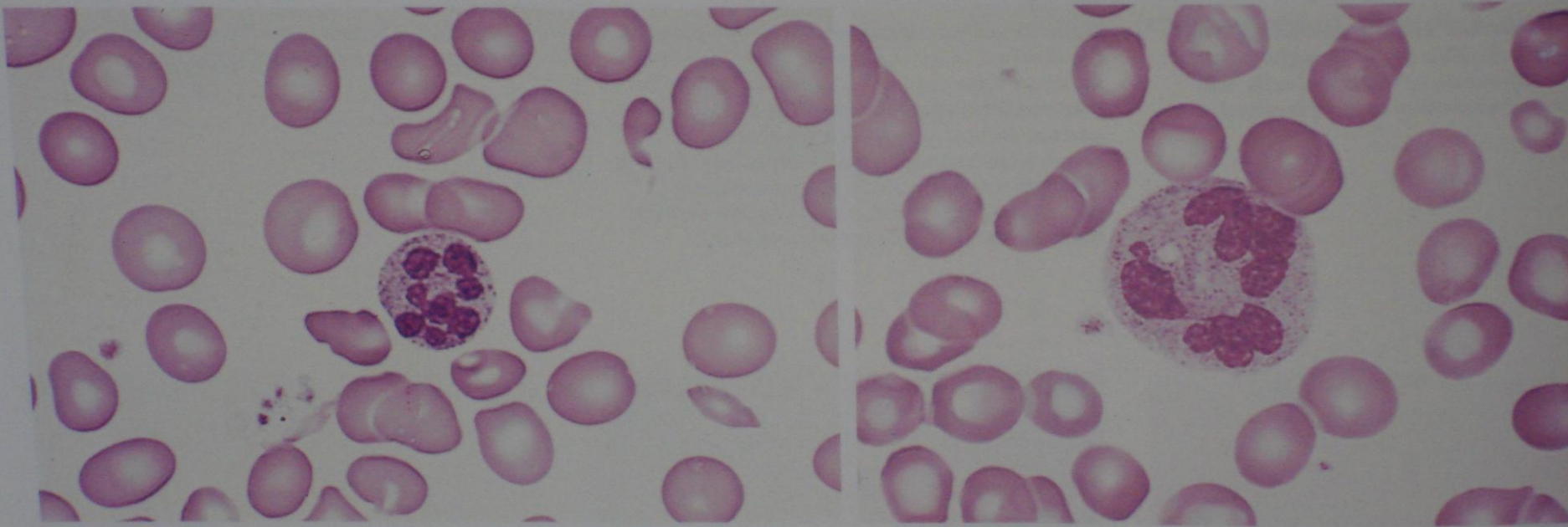
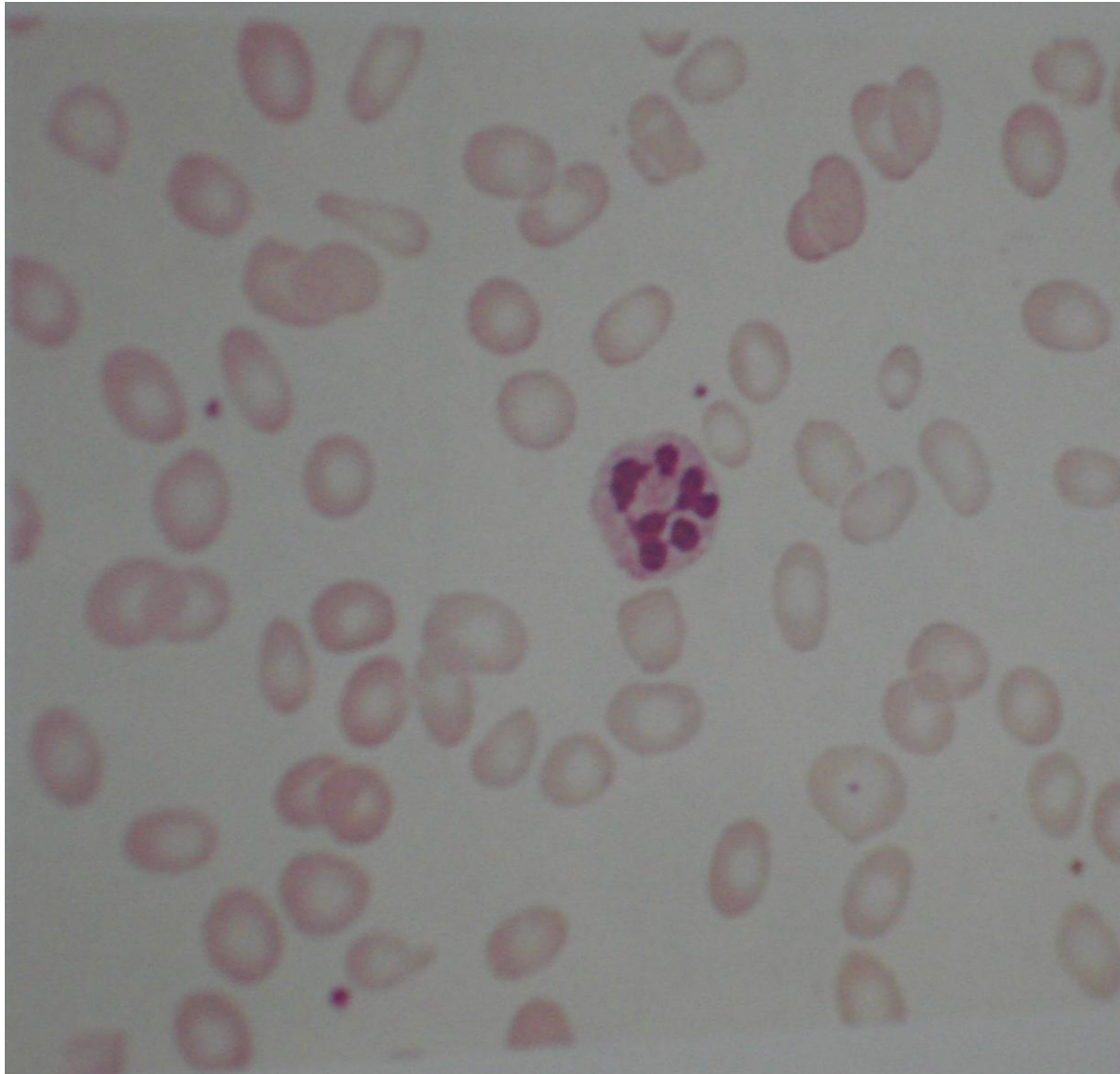


Fig. 3.13

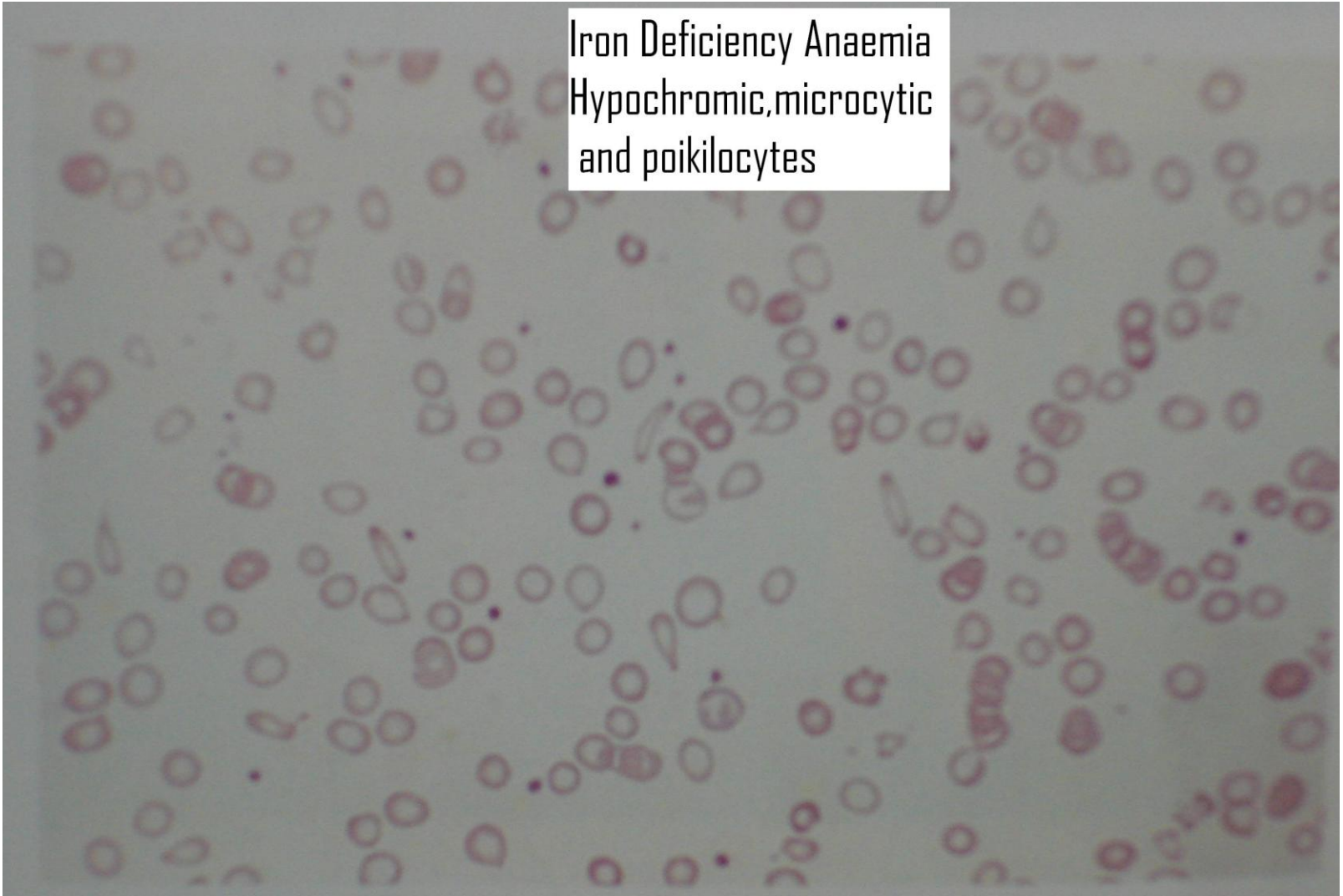
Megaloblastic anaemia: higher power views showing (left) a hypersegmented neutrophil and (right) a hyperdiploid neutrophil or 'macropolycyte'.

Megaloblastic anaemia-Showing hypersegmented neutrophil



Iron deficiency anaemia

Iron Deficiency Anaemia
Hypochromic, microcytic
and poikilocytes



Haemolytic anaemia slide

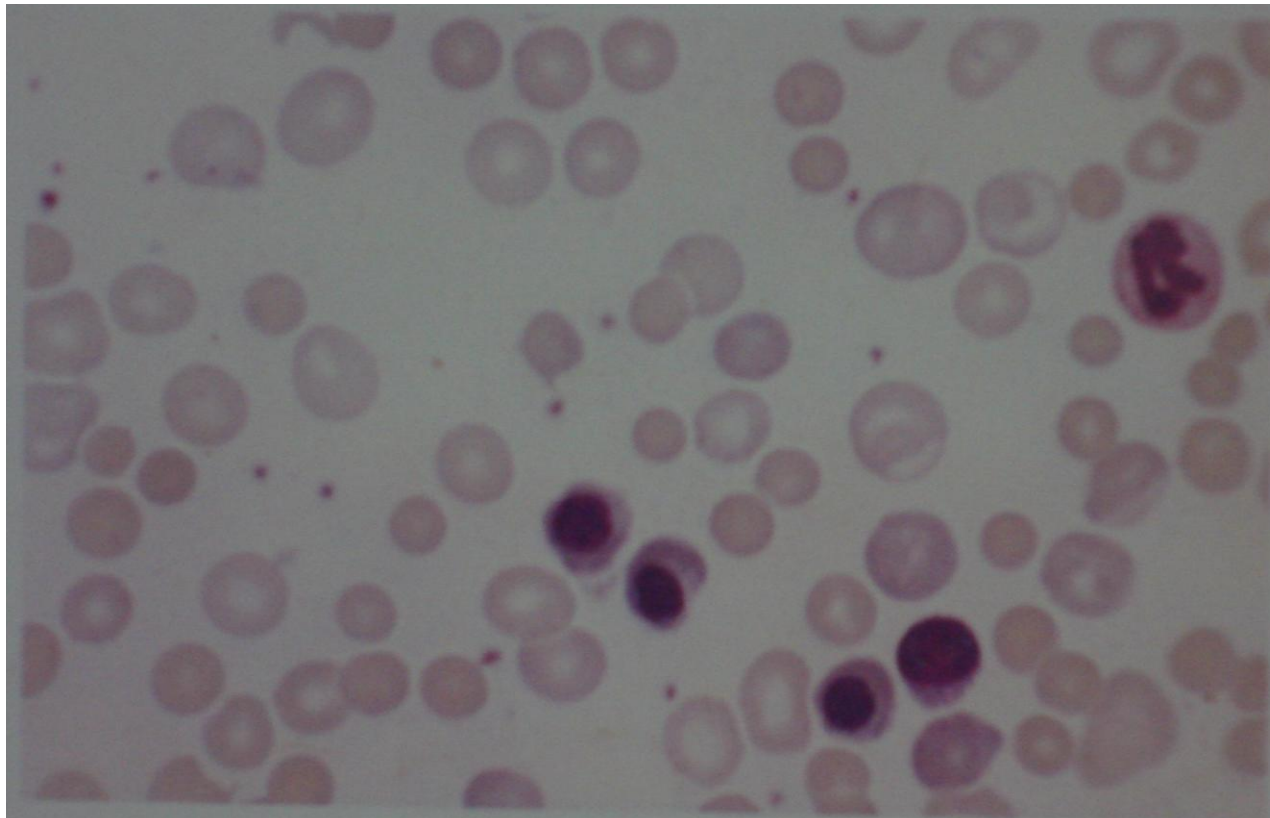
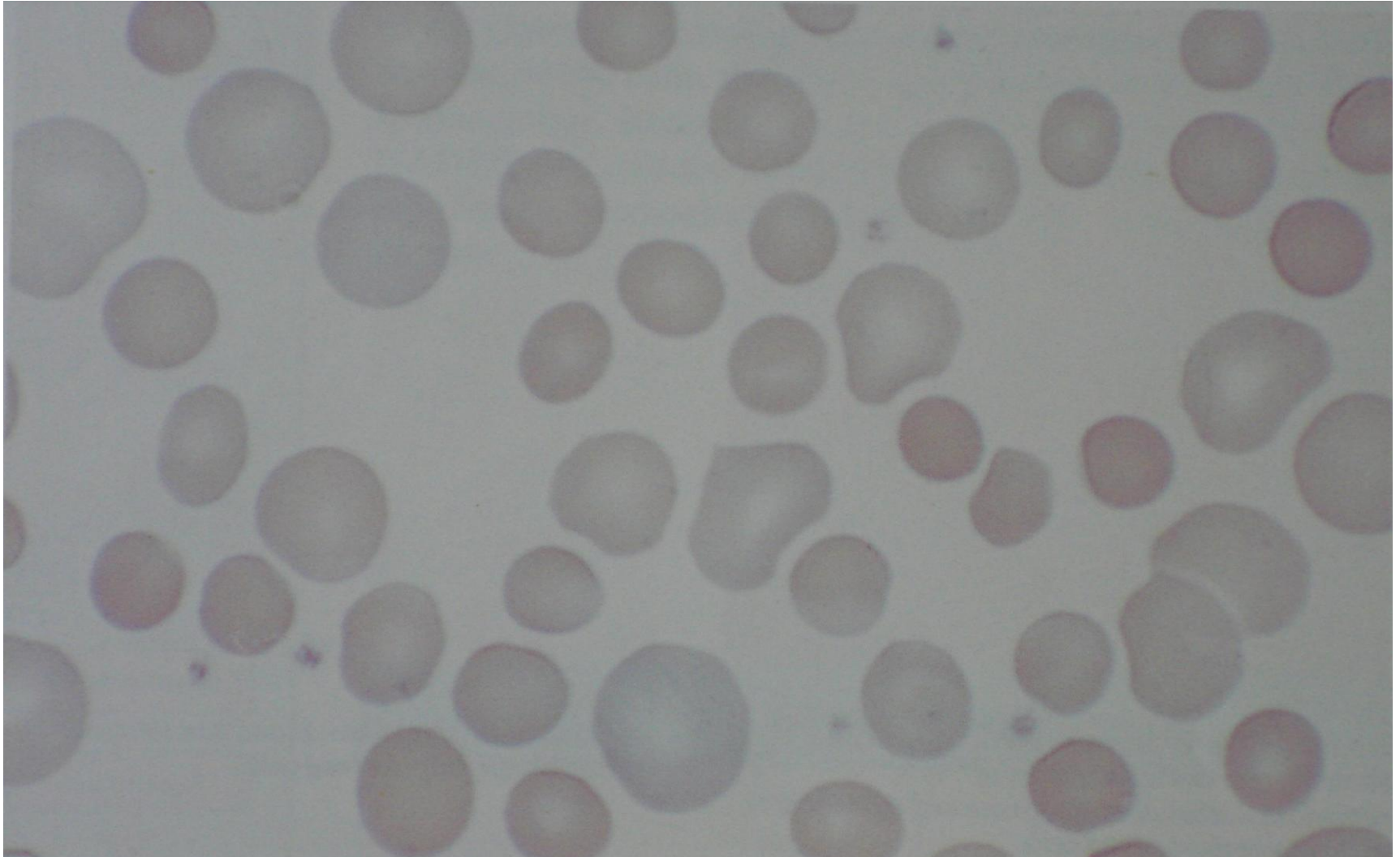


Fig. 4.9
Haemolytic anaemia (autoimmune): peripheral blood film showing erythroblasts, red cell polychromasia and spherocytosis.

Hereditary spherocytosis



Hereditary elliptocytosis, stomatocytosis and acanthocytosis

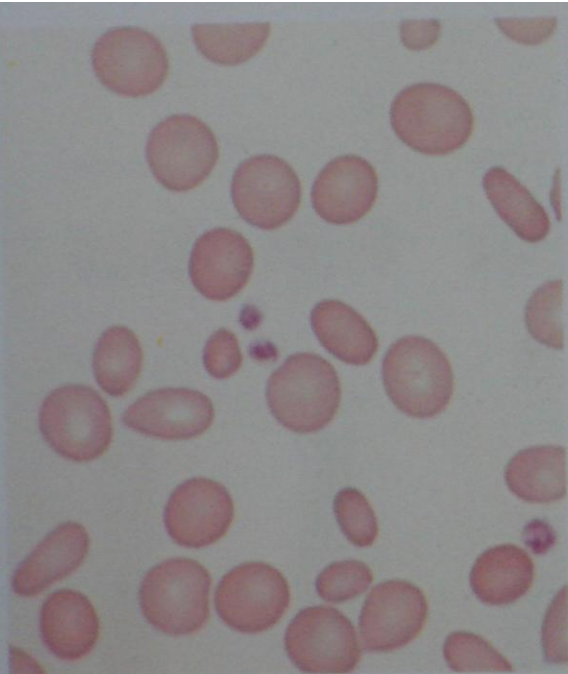


Fig. 4.24
Hereditary elliptocytosis: peripheral blood film from the child in Fig. 4.23 shows red cell anisocytosis and poikilocytosis, with elliptocytes and microspherocytes, a hereditary pyropoikilocytosis.

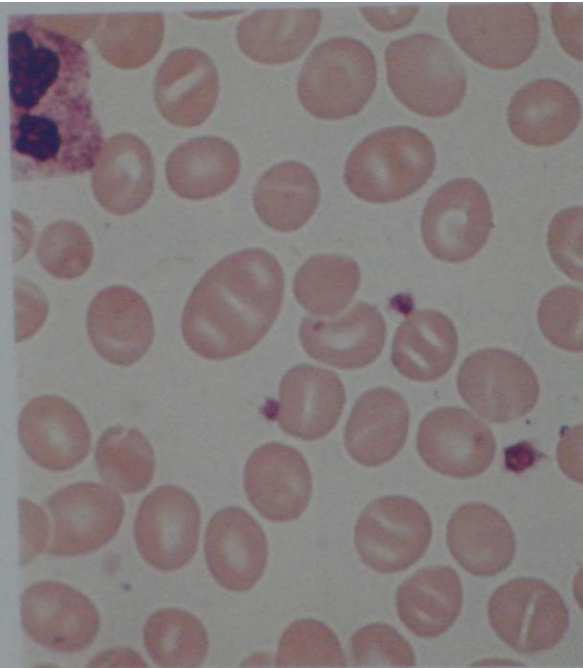


Fig. 4.25
Hereditary stomatocytosis: peripheral blood film showing many cells with the characteristic loosely folded appearance of the membrane. The membrane has increased passive permeability, allowing excess sodium entry.

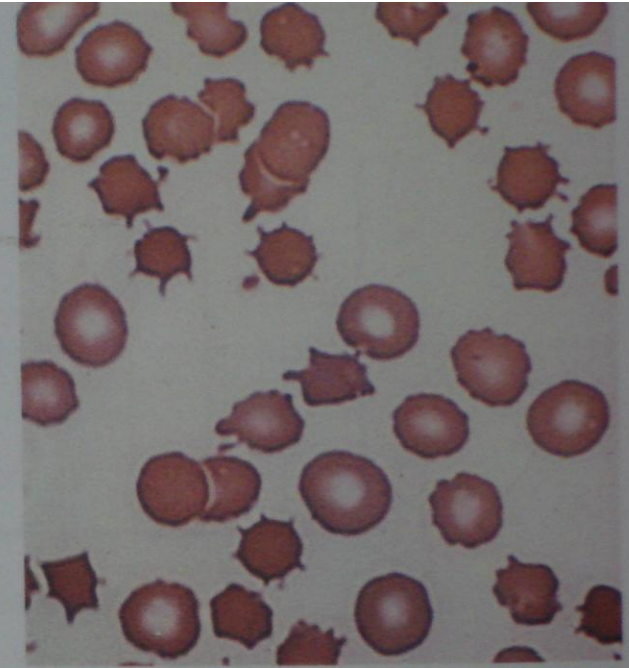
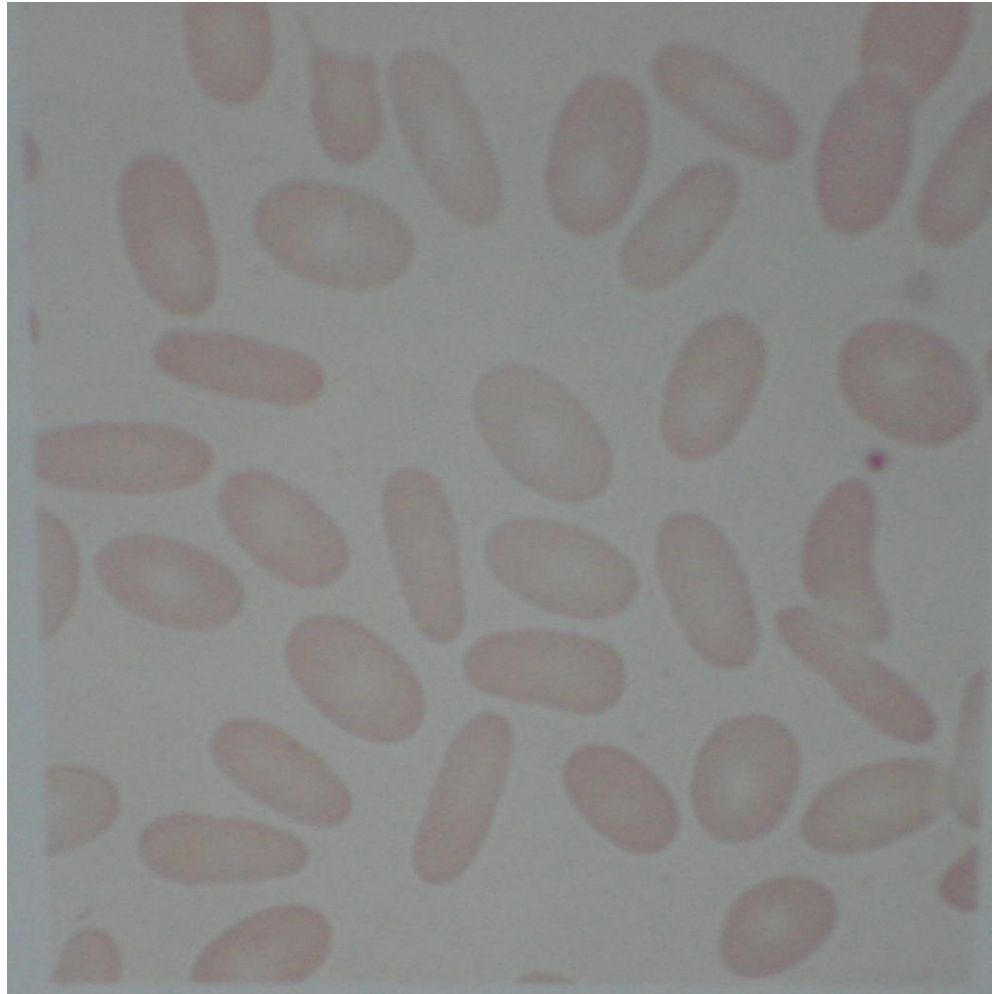


Fig. 4.26
McLeod phenotype: peripheral blood film showing marked acanthocytosis of red cells associated with the rare McLeod blood group. There is lack of the Kell antigen precursor (Kx).

Hereditary elliptocytosis



Auto immune haemolytic anaemia

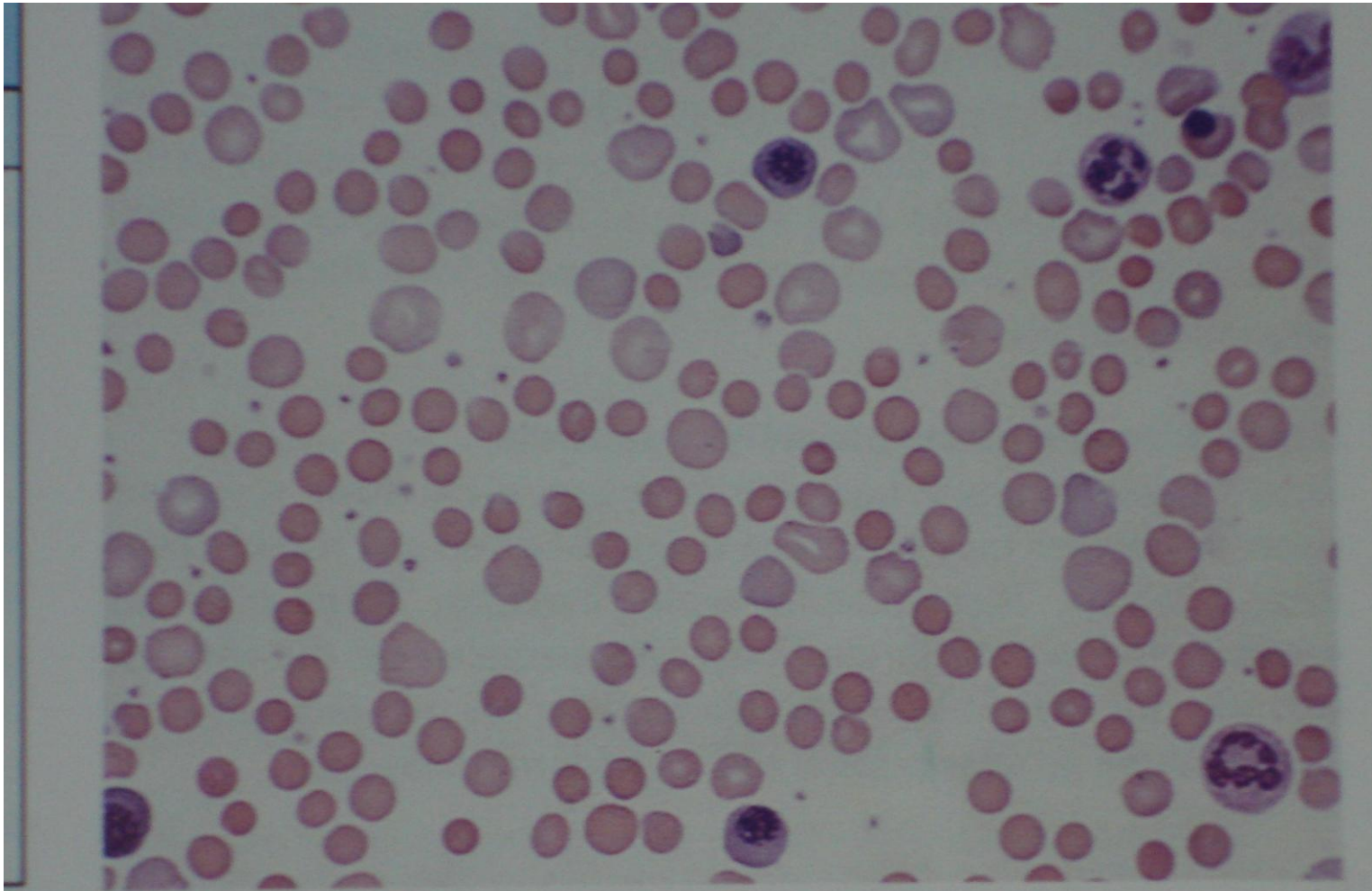
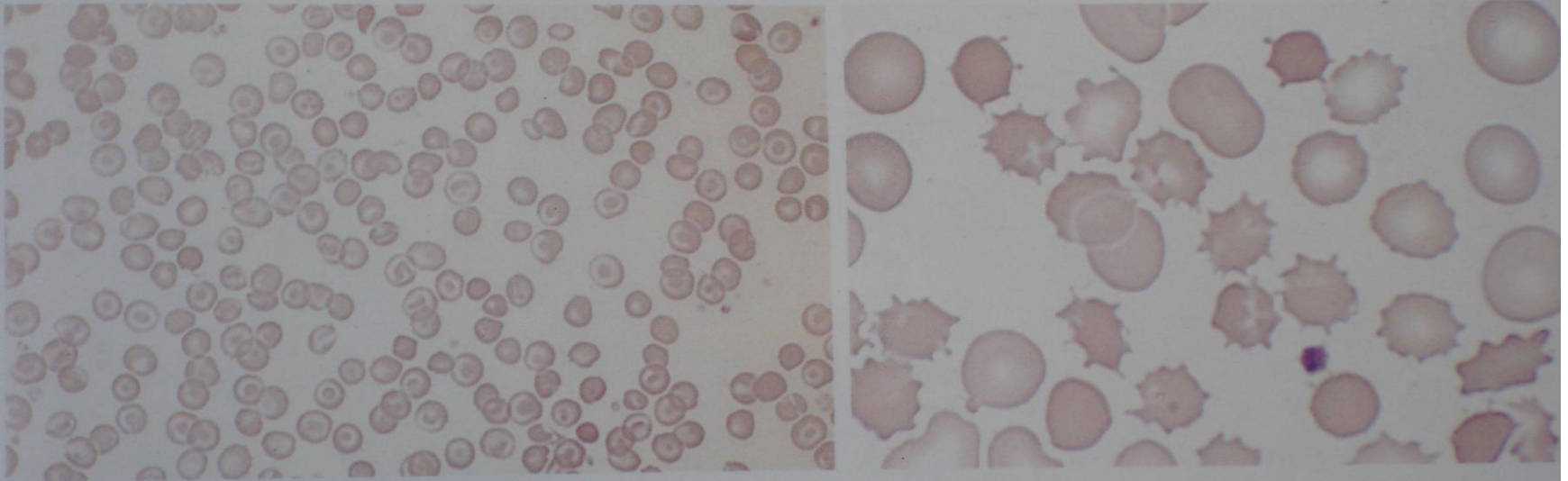


Fig. 4.39

Autoimmune haemolytic anaemia: peripheral blood film showing erythroblasts, polychromatic macrocytes and marked spherocytosis.

Target cells and acanthocytes



*Fig. 6.34
Liver disease: peripheral blood films showing (left) marked target cell formation and (right), at higher magnification, marked red cell acanthocytosis.*

LE cell

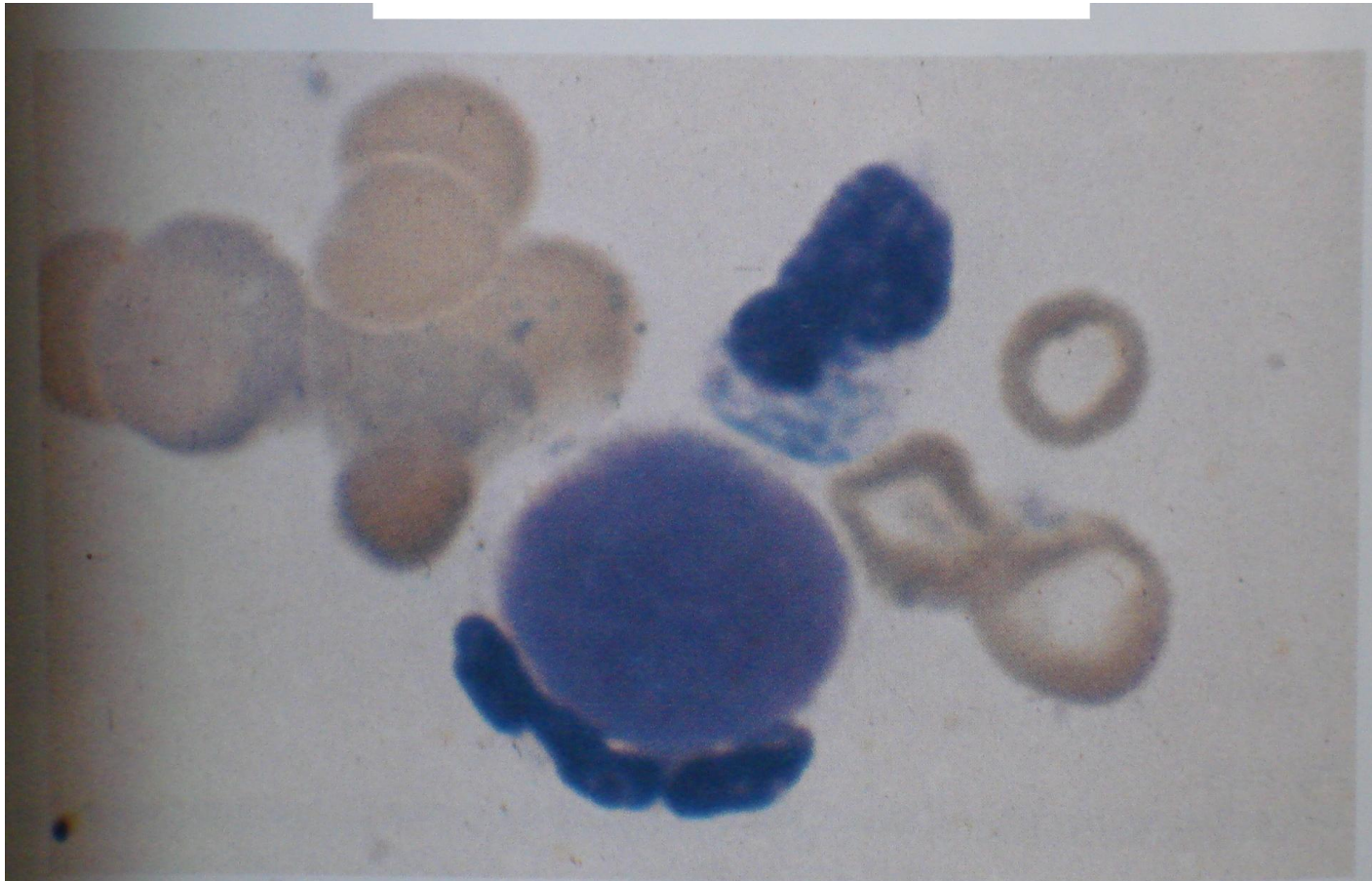
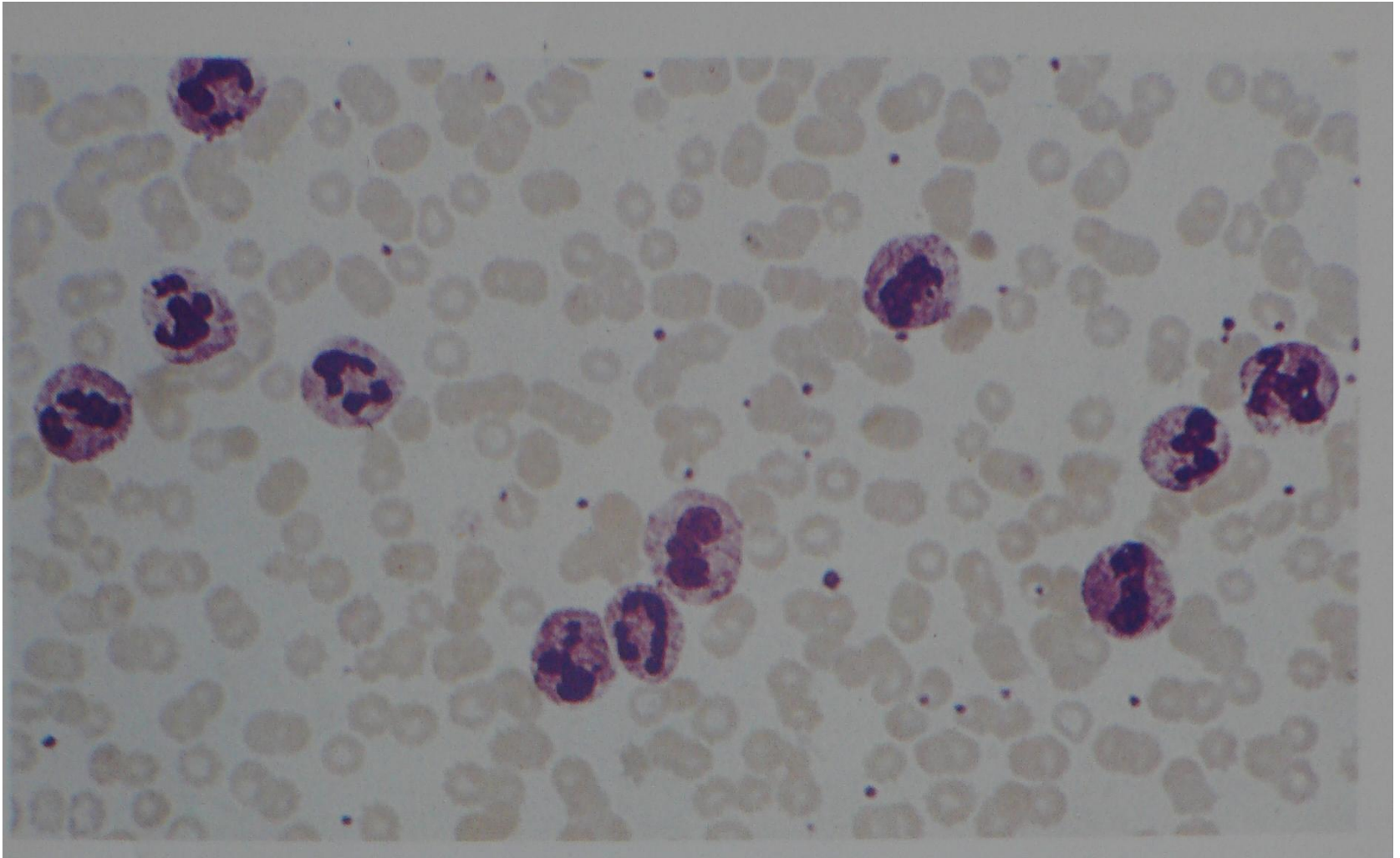


Fig. 6.38

Positive lupus erythematosus (LE) cell test: the amorphous purple-staining nucleus has been phagocytosed by a neutrophil.

Neutrophilia



AML

Acute lymphoblastic leukaemia: testicular swelling and erythema of the left side of the scrotum due to testicular infiltration. Courtesy of Dr J.M. Chessells.

Acute lymphoblastic leukaemia: radiographs of children's skulls showing (left) a mottled appearance due to widespread leukaemic infiltration of bone and (right) multiple punched-out lesions due to leukaemic deposits. Courtesy of Dr J.M. Chessells.

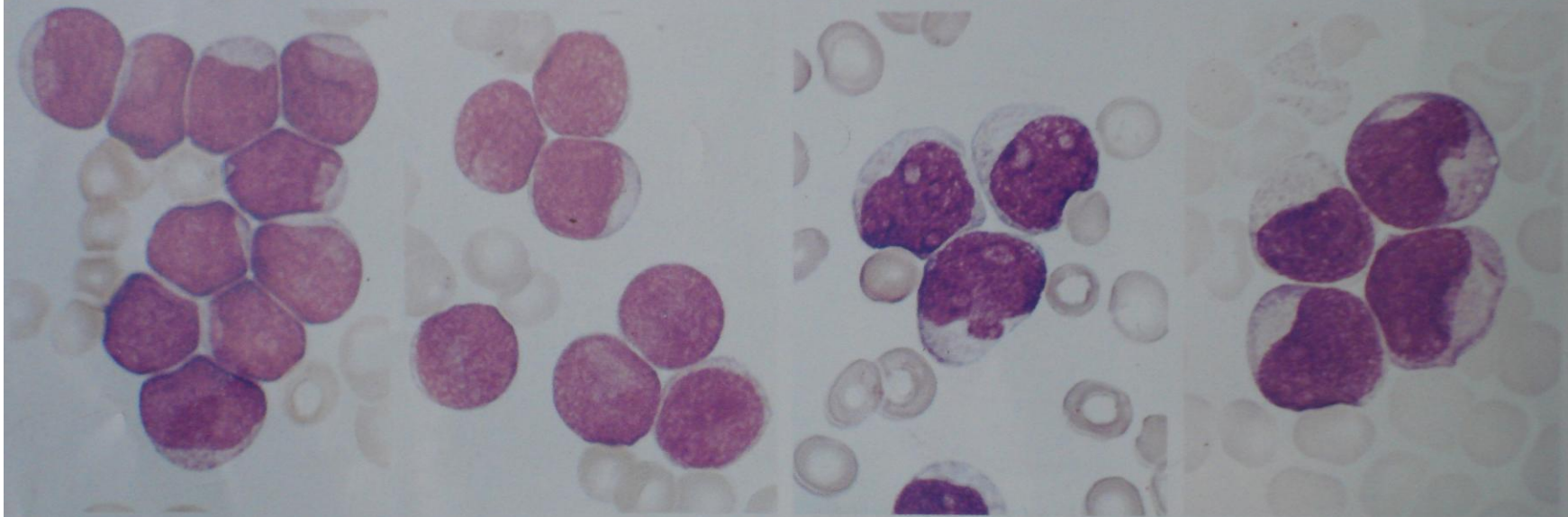
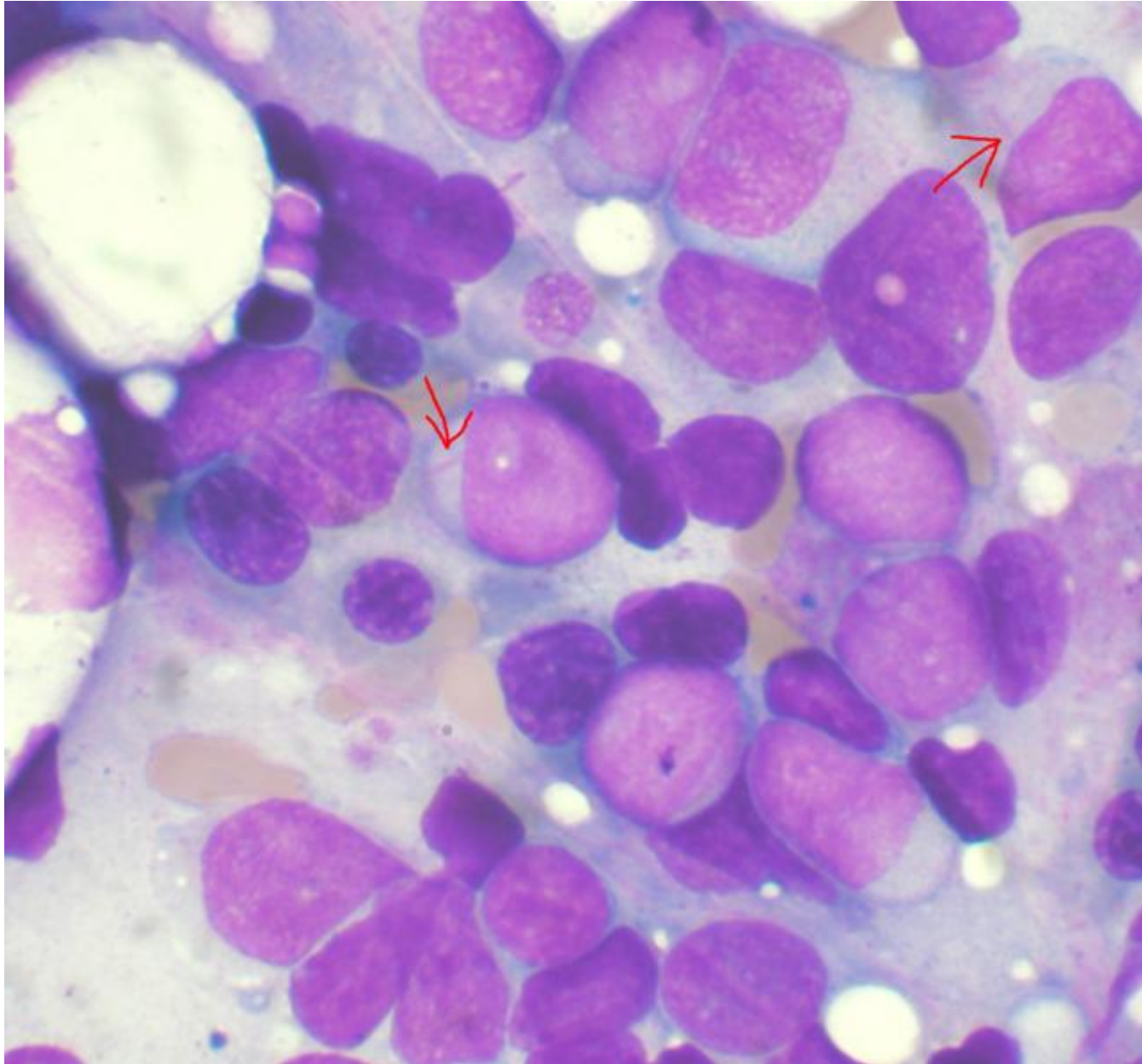
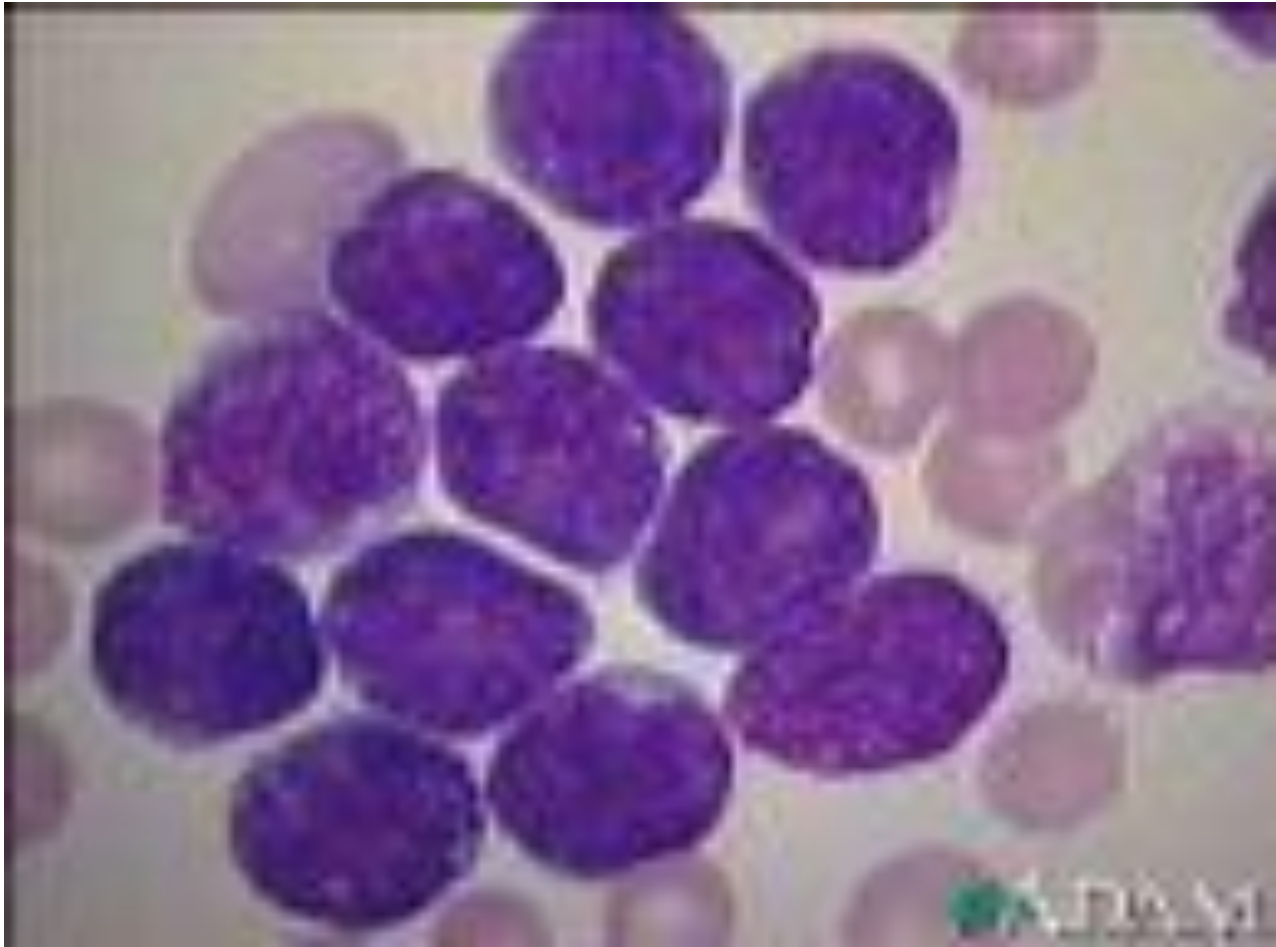


Fig. 8.22
Acute myeloblastic leukaemia, M₁ subtype: bone marrow aspirates showing blasts with large, often irregular, nuclei with one or more nucleoli, and with varying amounts of eccentrically placed cytoplasm. There is either no definite granulation or a few azurophilic granules and occasional Auer rods. At least 3% of cells stain with Sudan black or myeloperoxidase.

AML-Auer rods



ALL



This picture shows the darkly-stained lymph cells (lymphoblasts) seen in acute lymphocytic leukemia (ALL), the most common type of childhood leukemia.

ALL

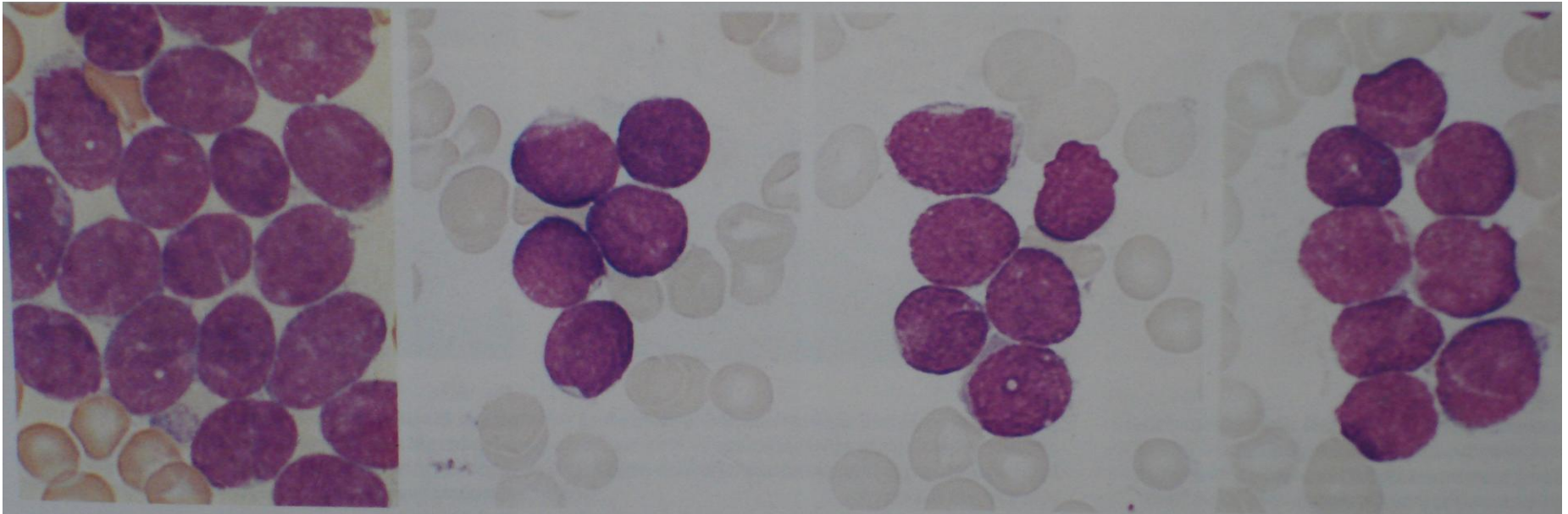


Fig. 8.32

Acute lymphoblastic leukaemia, L₁ subtype: rather small, uniform blast cells with scanty cytoplasm, and rounded or cleft nuclei with usually a single nucleolus.

CLL

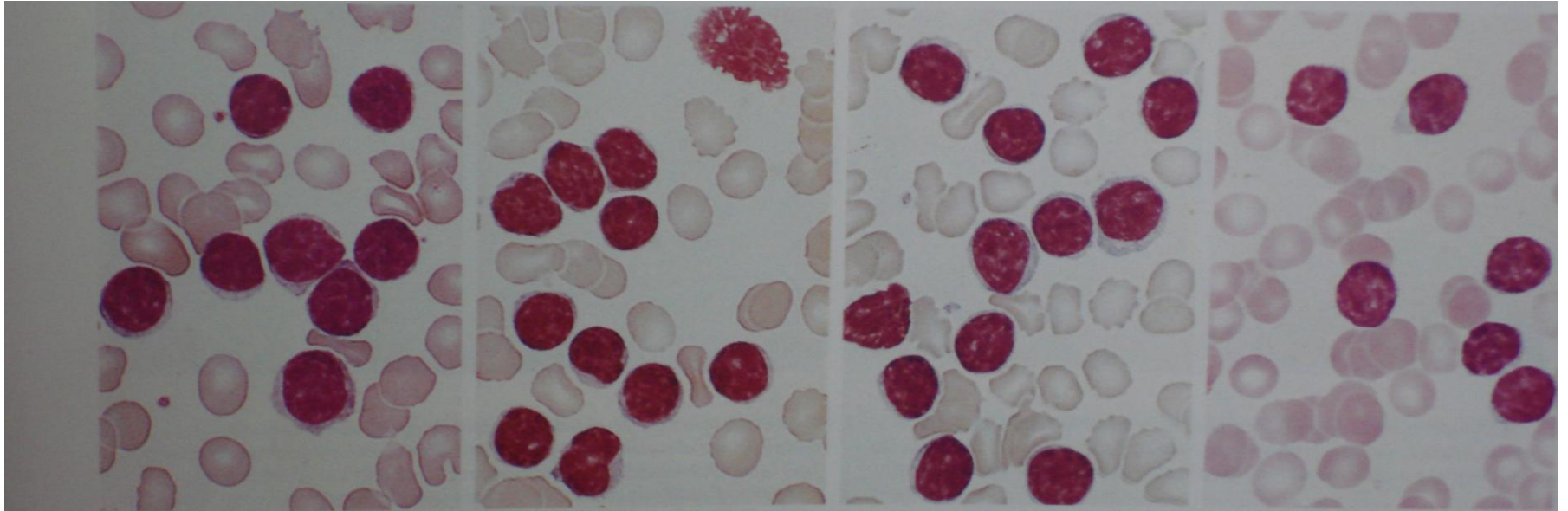


Fig. 9.9

Chronic lymphocytic leukaemia: lymphocytes from the peripheral blood of four different patients show thin rims of cytoplasm, condensed coarse chromatin and only rare nucleoli.

CML

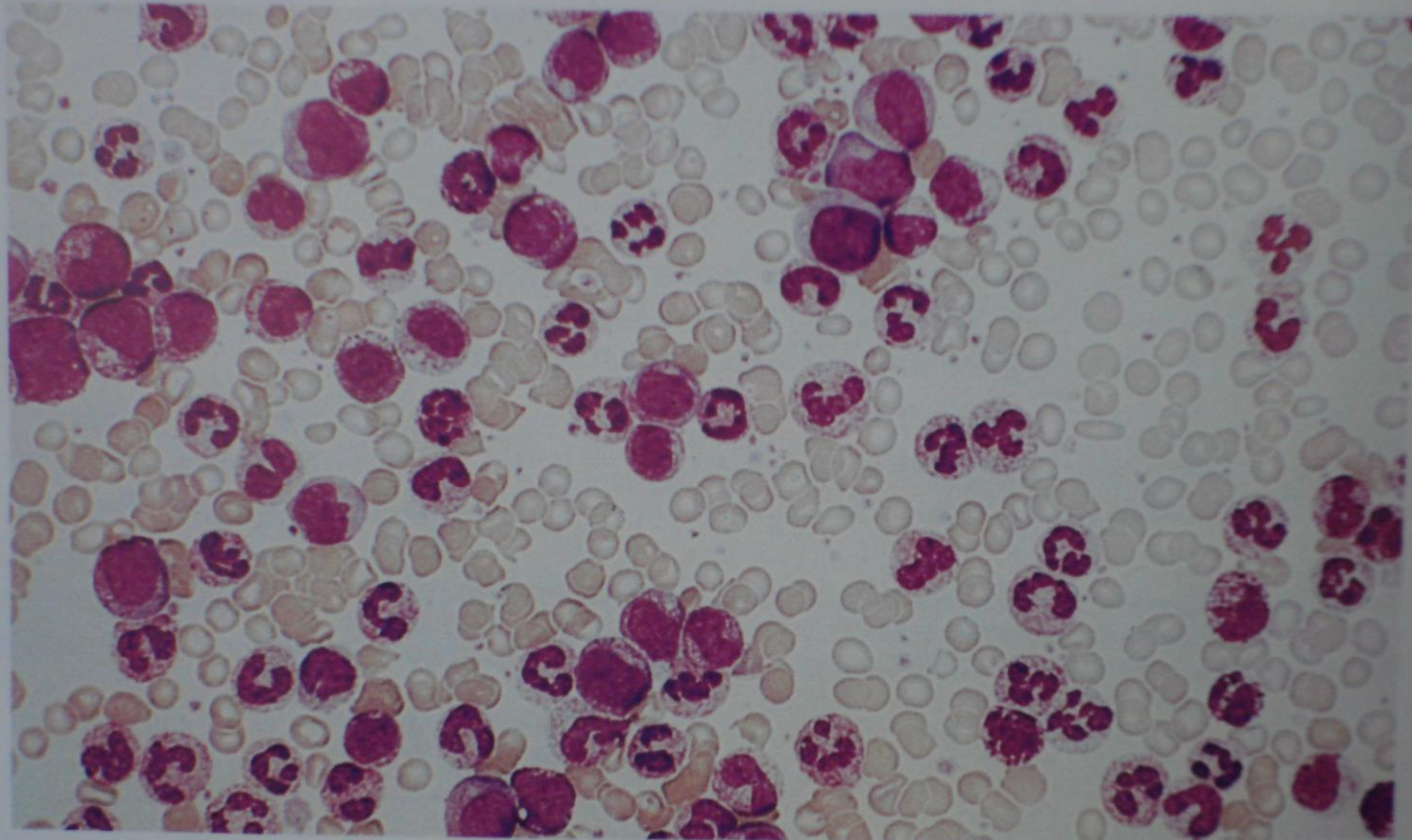


Fig. 9.41

Chronic myeloid leukaemia: peripheral blood film showing cells in all stages of granulopoietic development. Hb:16.8g/dl; WBC: $260 \times 10^9/l$; platelets: $140 \times 10^9/l$.

CML

platelets: $850 \times 10^9/l$; serum uric acid: 0.85mmol/l.

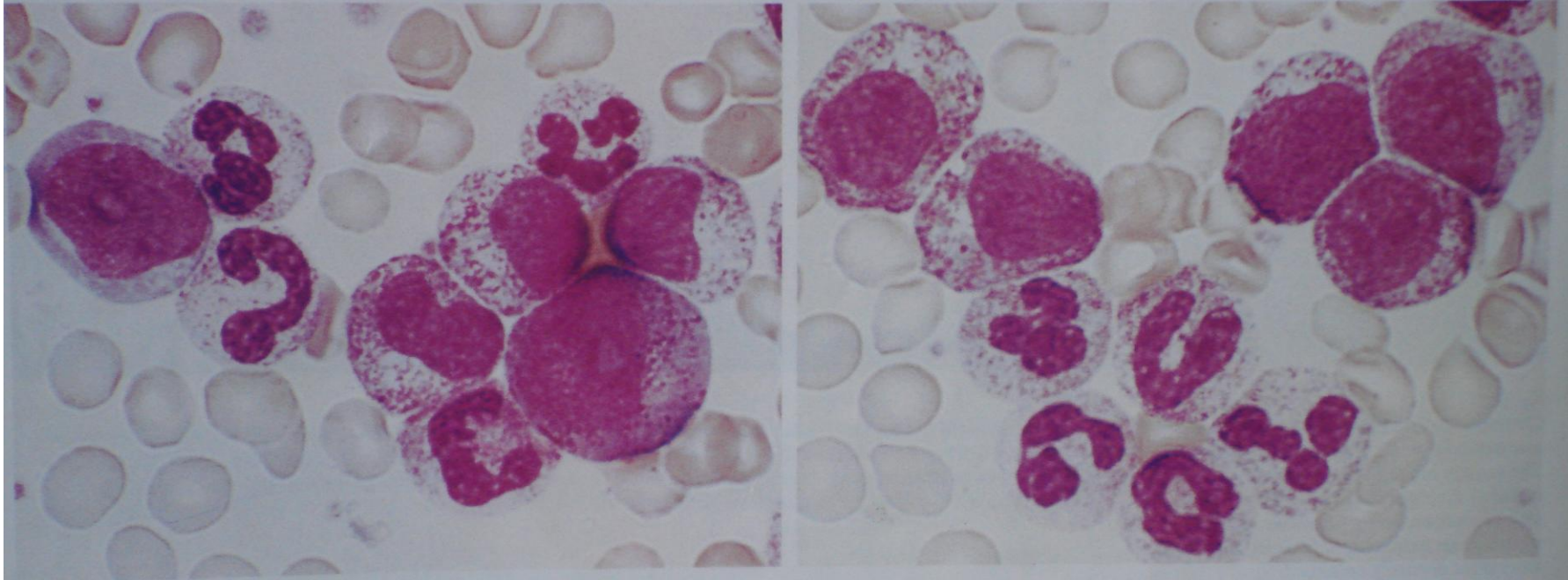


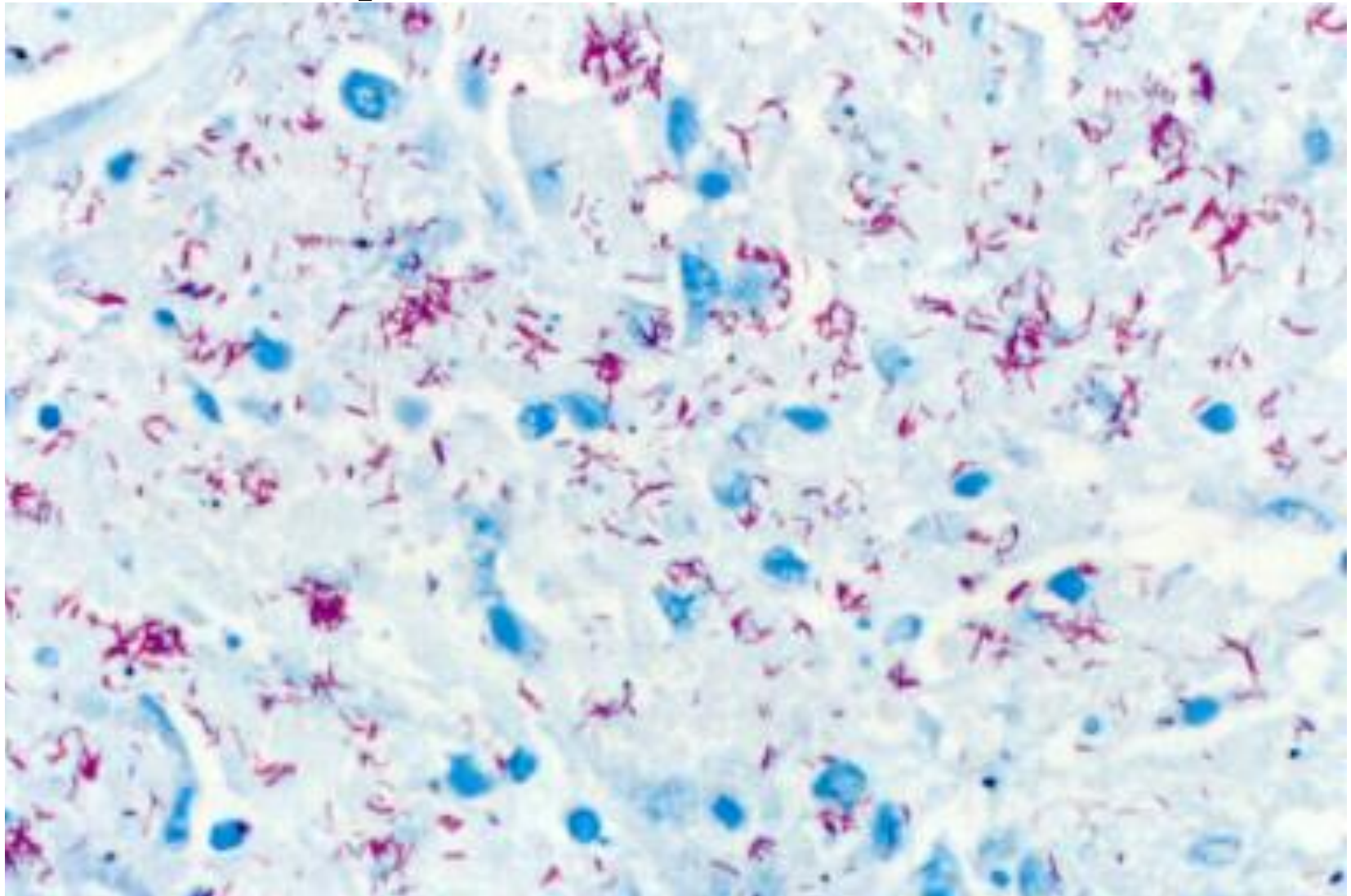
Fig. 9.42
Chronic myeloid leukaemia: peripheral blood films showing a myeloblast, promyelocytes, myelocytes, metamyelocytes, and band and segmented neutrophils.

Whip worm

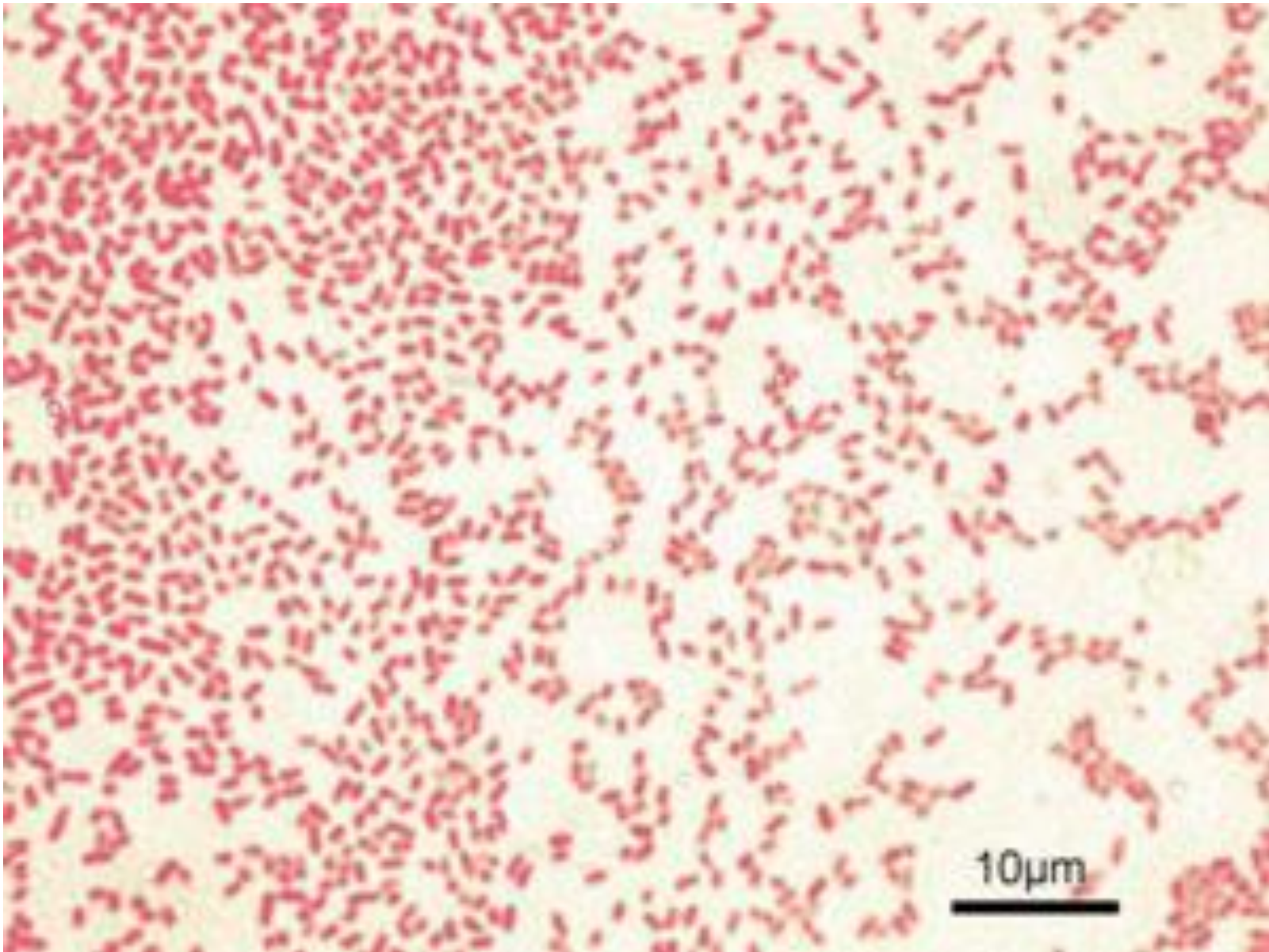
Whip worm (Trichinella spiralis)



Acid fast bacilli(AFB)



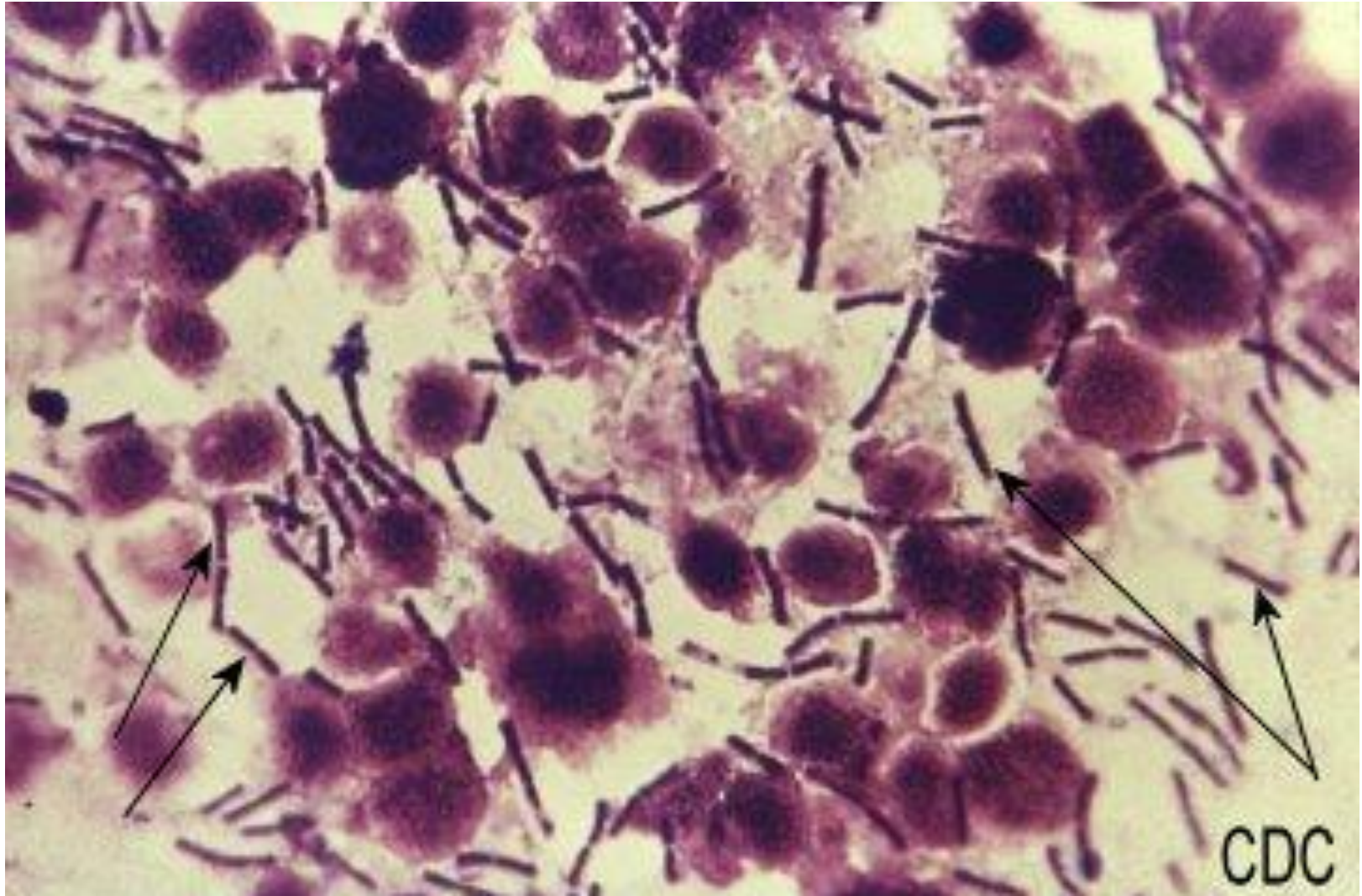
Gram Negative cocci



Gram negative rods



B. anthracis (Gram smear)



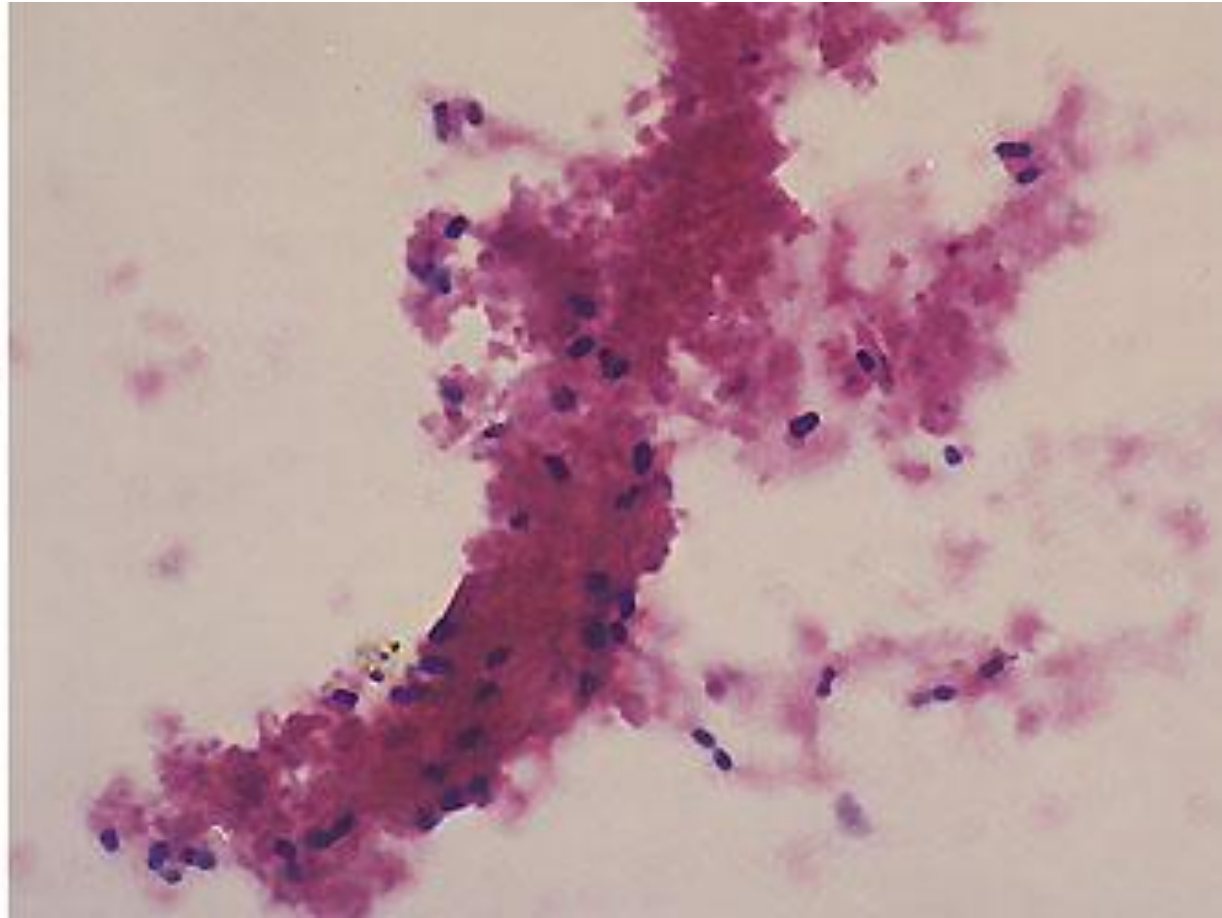
strep. pneumoniae

G(+)双球菌

Streptococcus pneumoniae
(肺炎球菌)

2個ずつの双球状で横に
長く見える。

(倍率 x1000x4)



Staph. aureus

G(+)球菌

Staphylococcus aureus

(黄色ブドウ球菌)

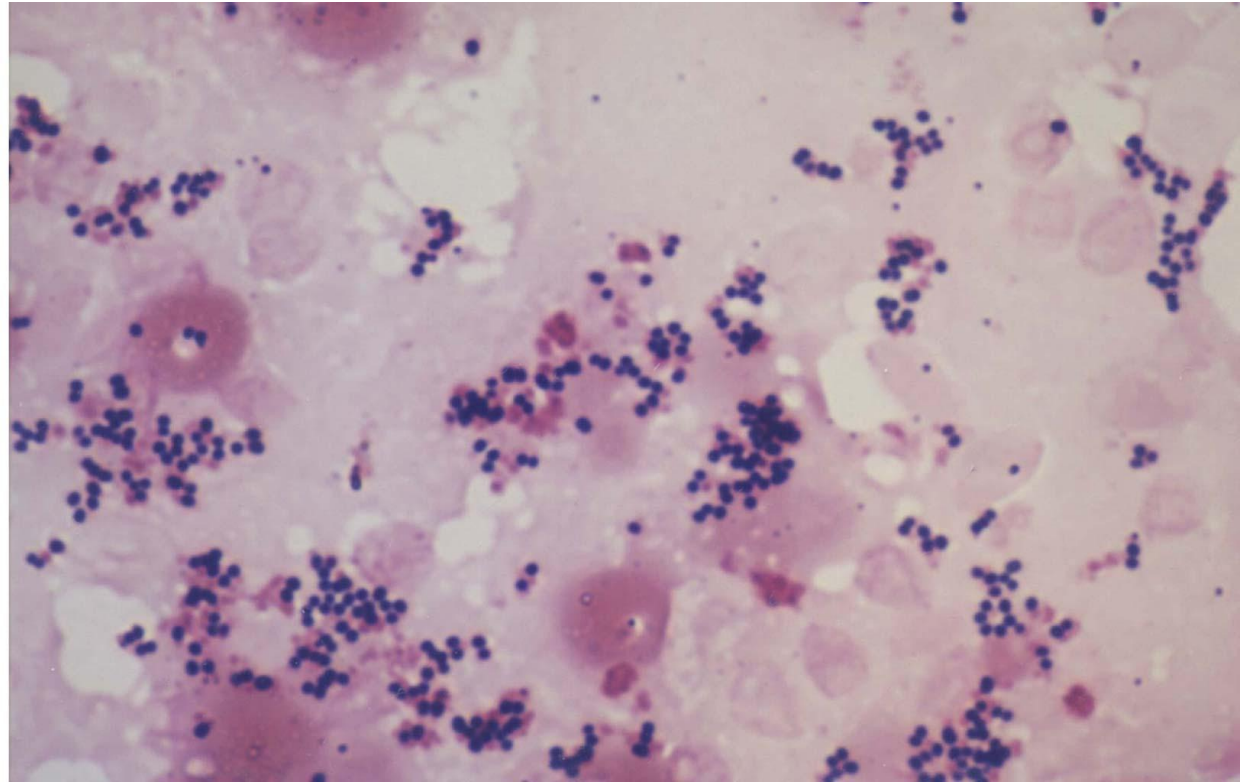
ブドウのふさ状。

菌の直径は 1μ 。

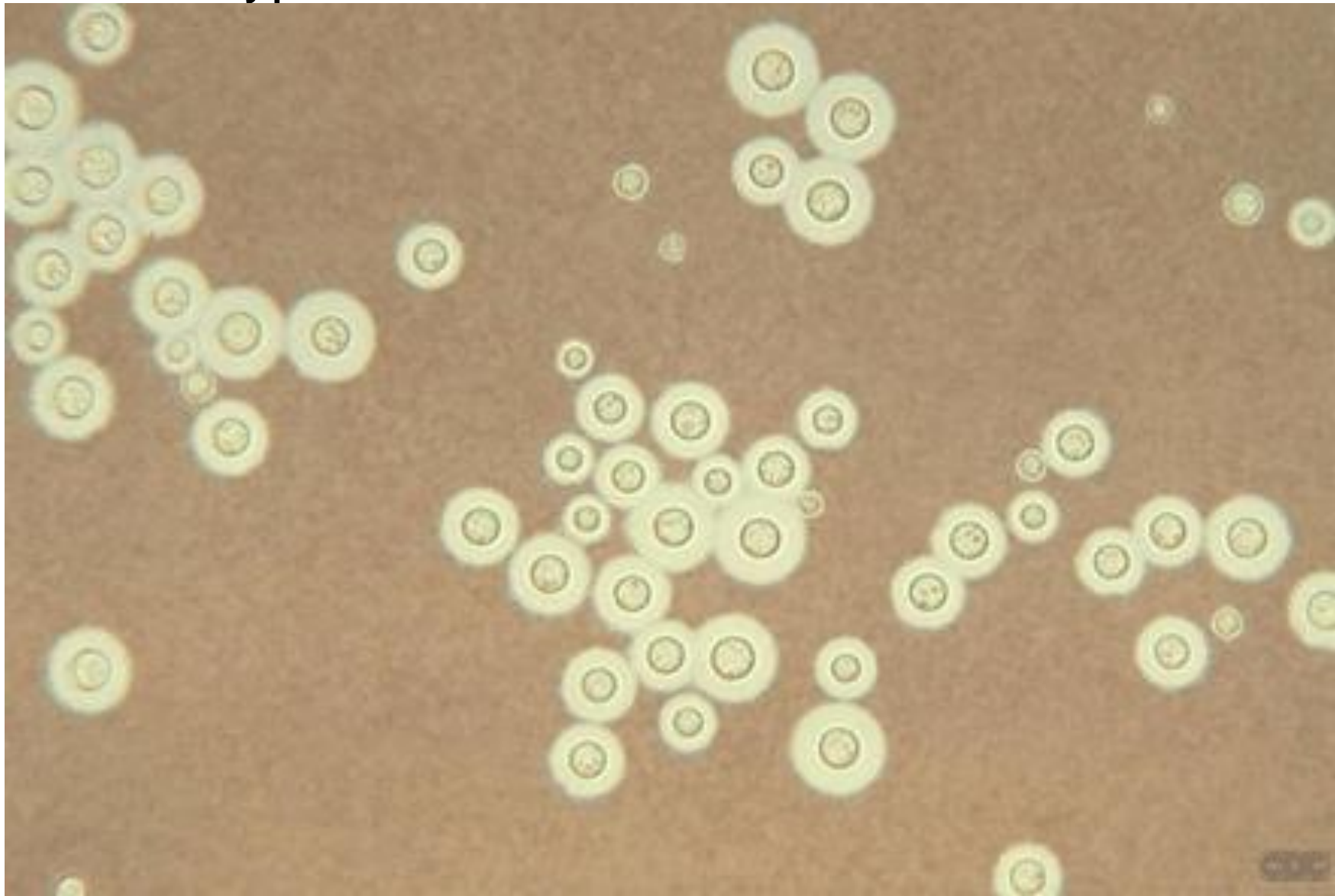
赤い細胞は赤

血球と白血球。

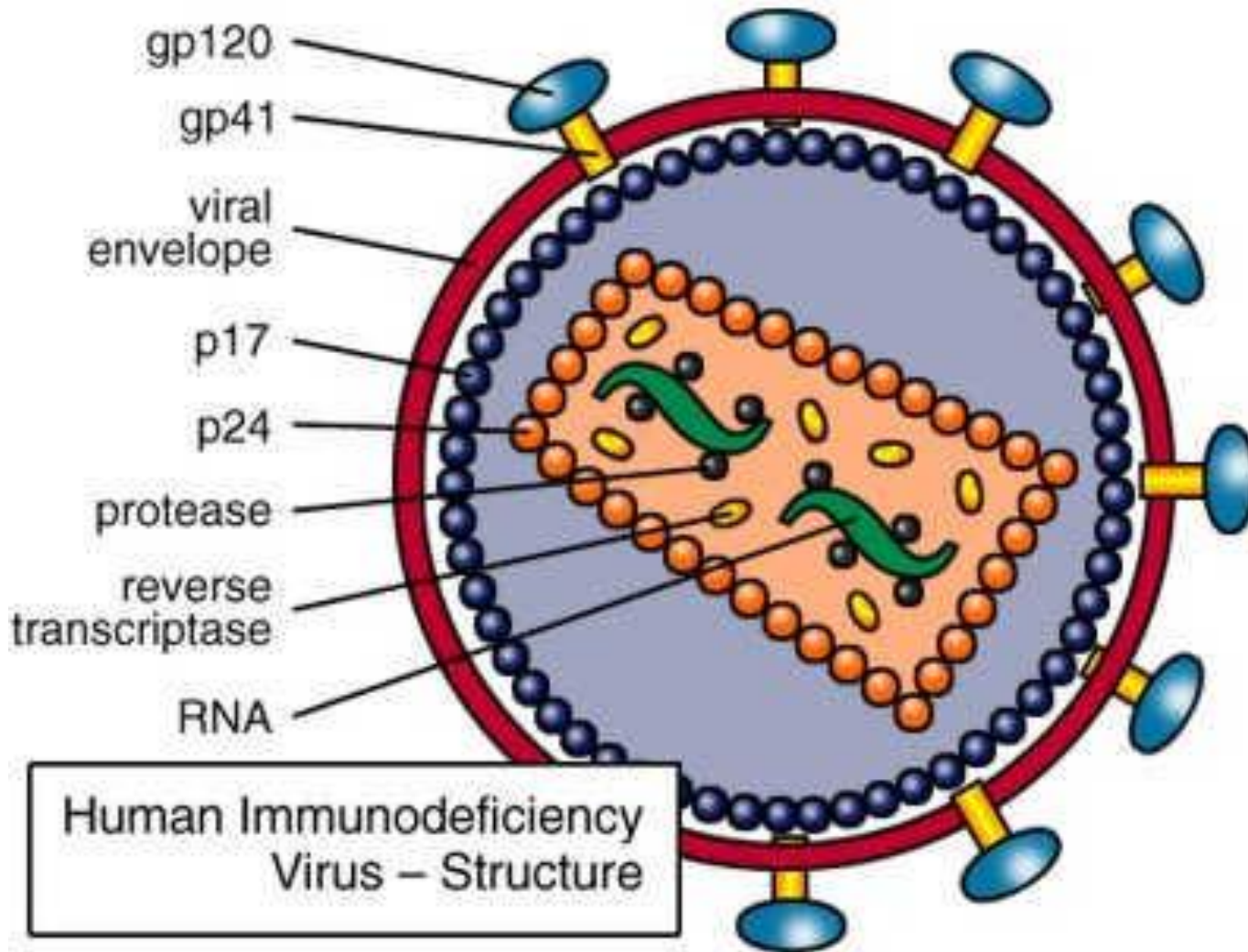
(倍率 $\times 1000 \times 4$)



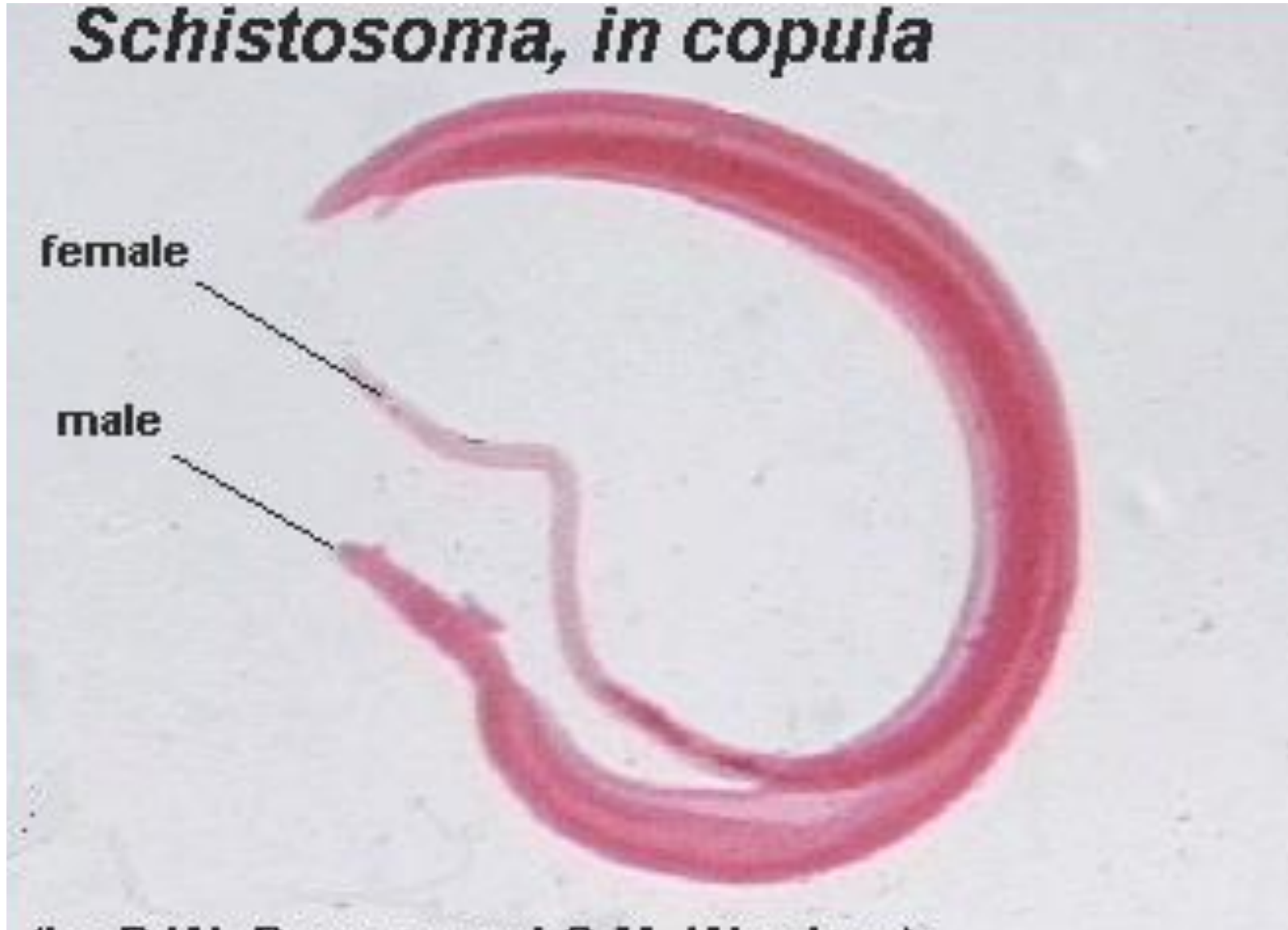
Crypto. Neoformans-India ink



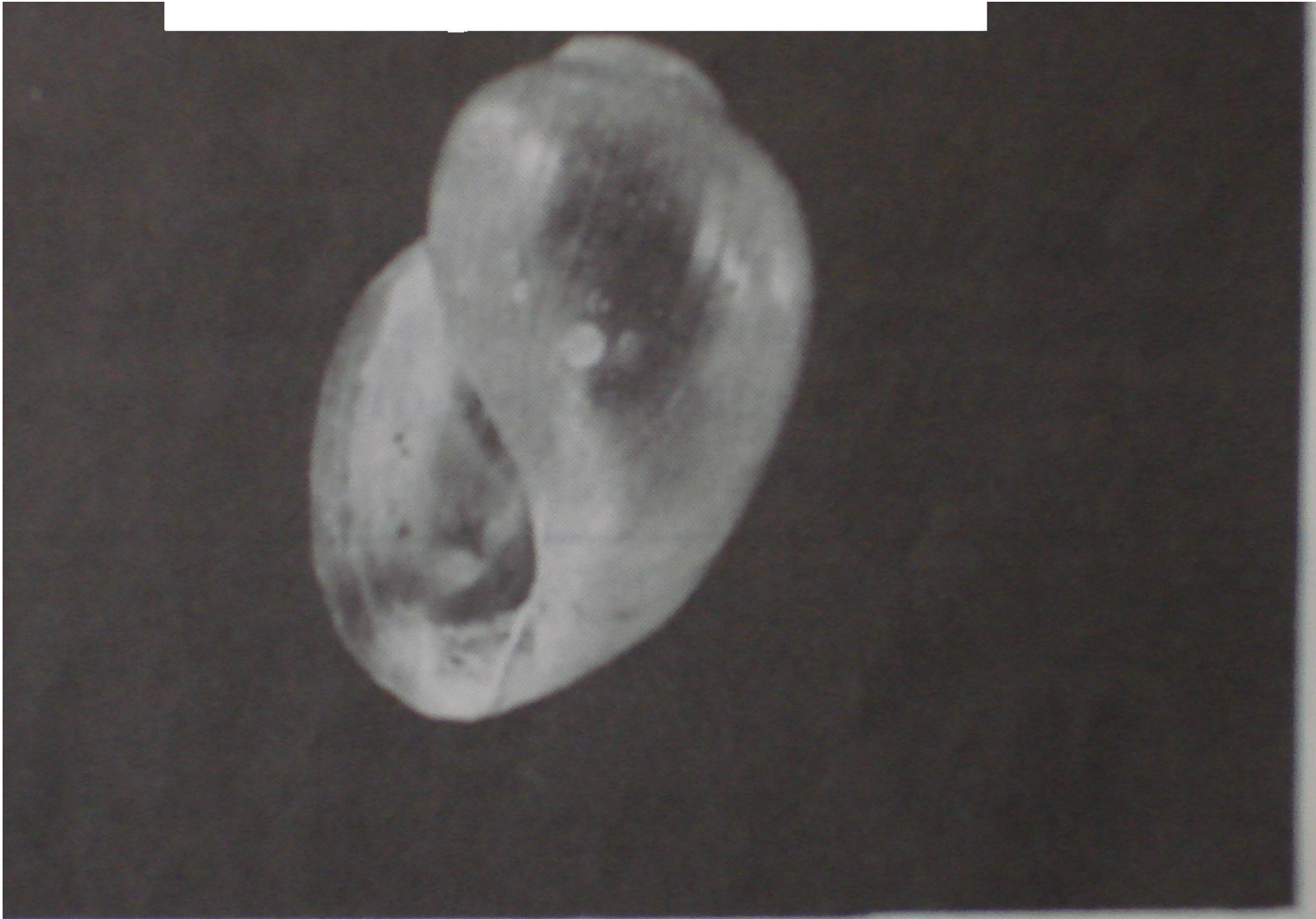
HIV



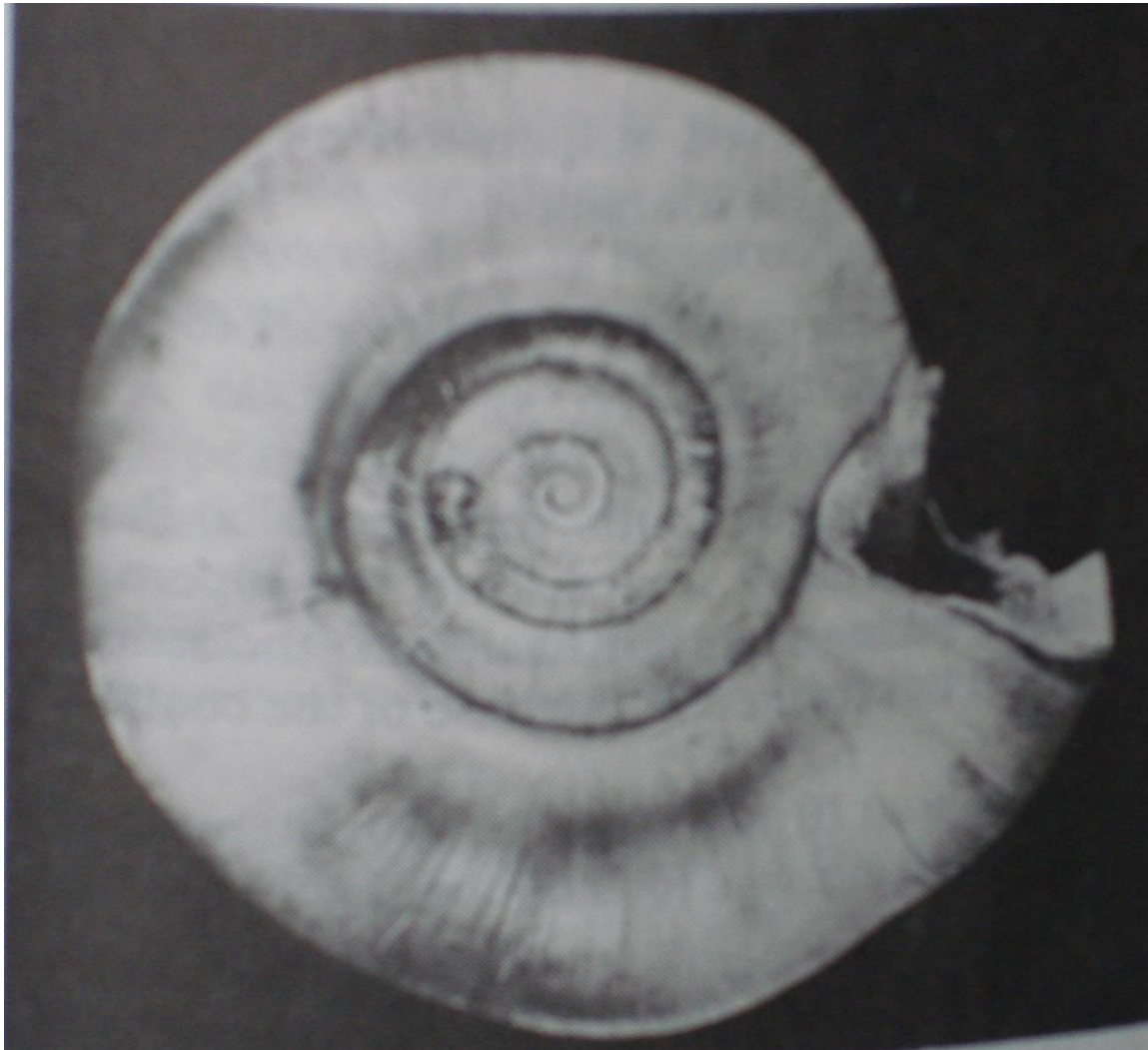
Adult schistosomes



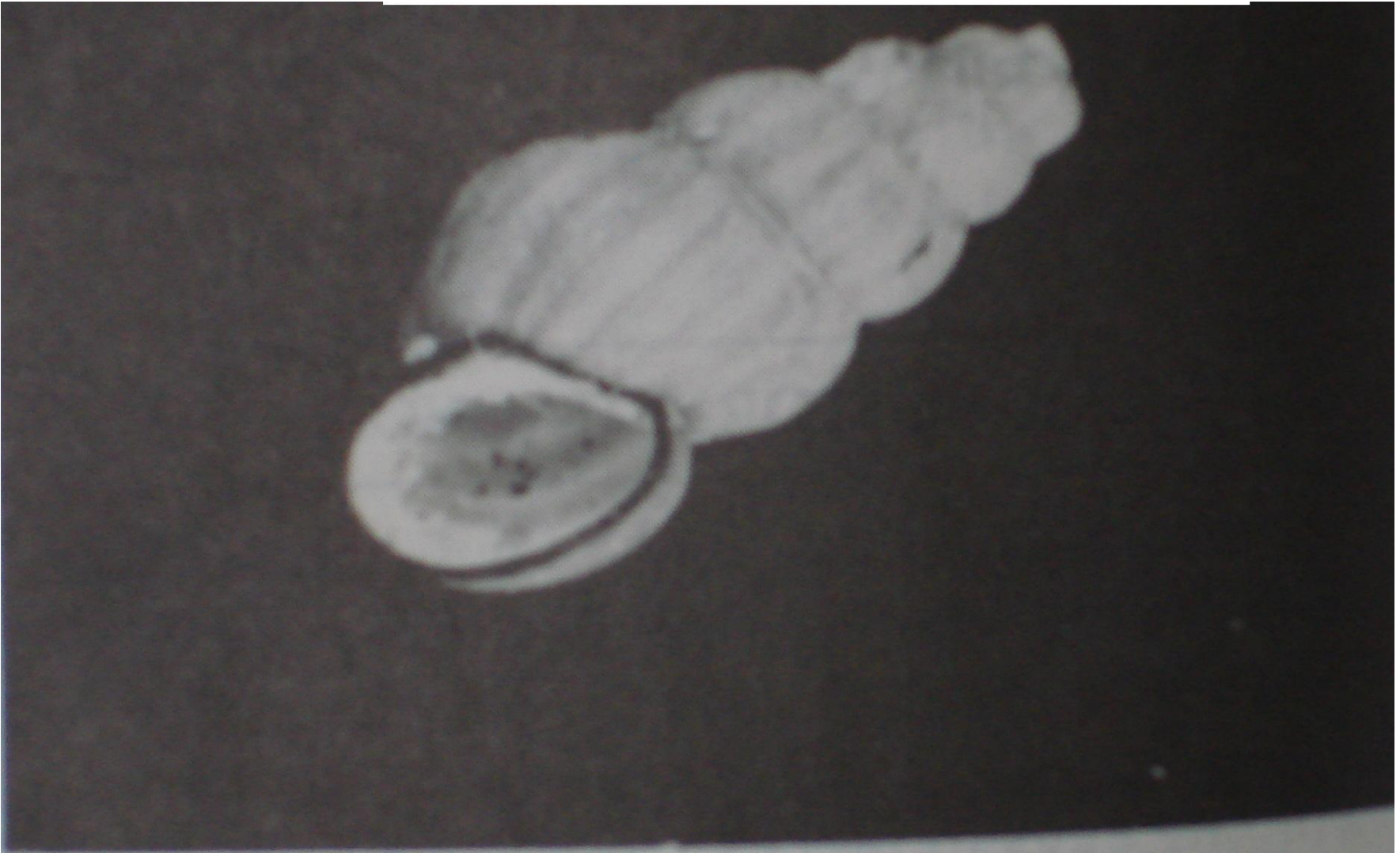
Bulinus snail-Hosts *S.haematobium* and *S.intercalatum*



Biomphalaria snail shell-hosts *S.mansoni*



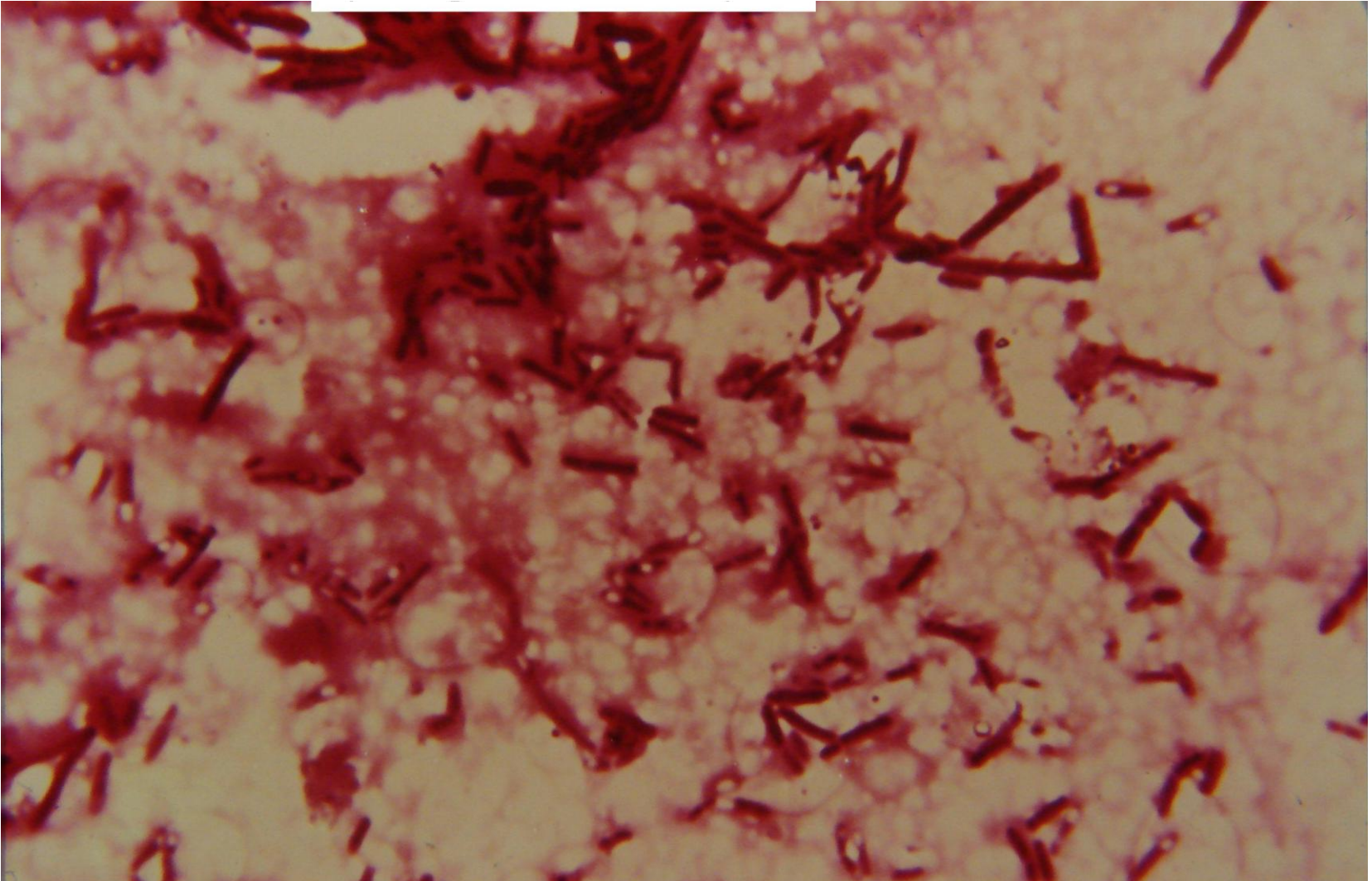
Oncomelania snail shell-hosts *S.japonicum*



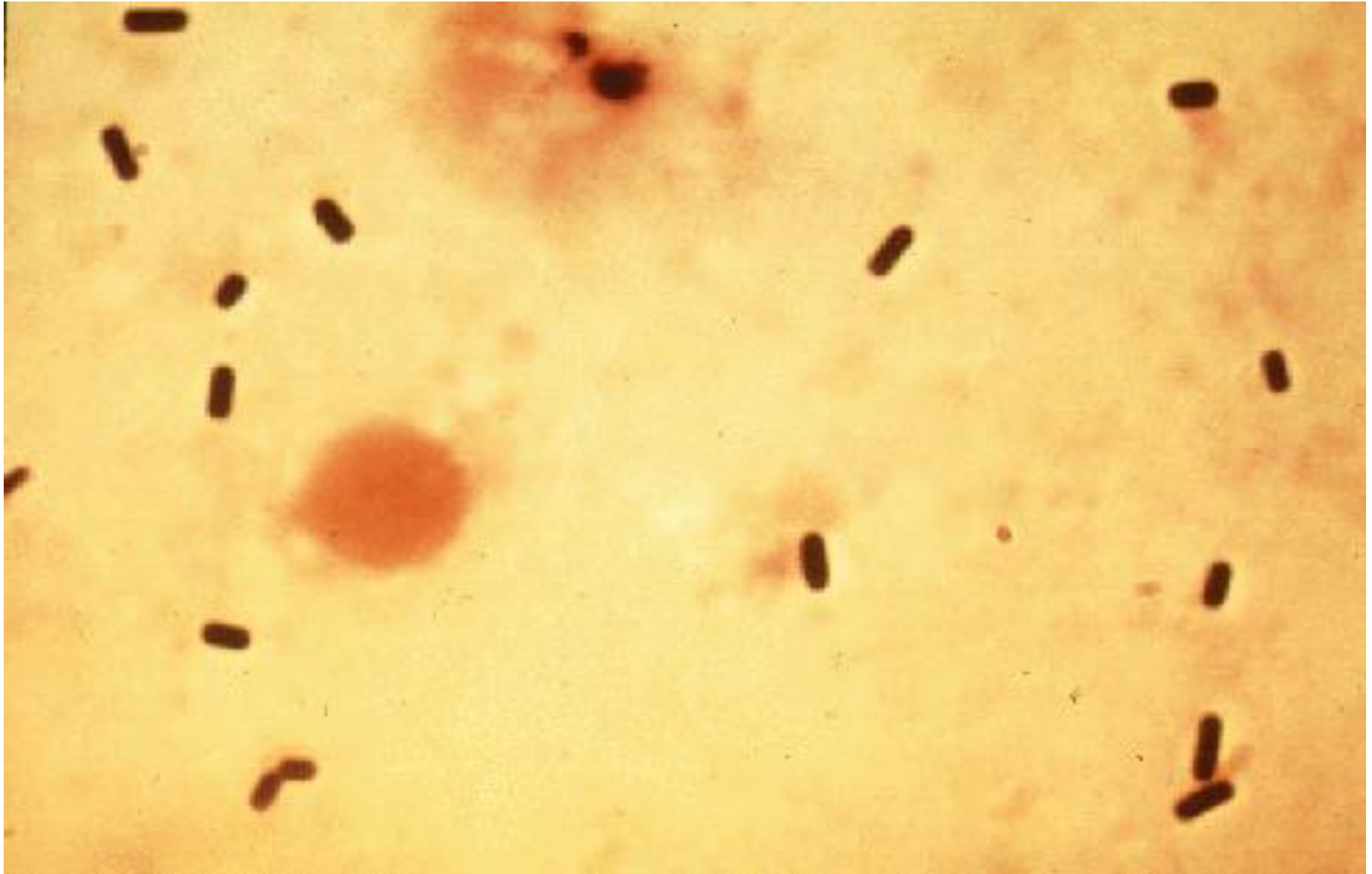
Cl.tetani-terminal spores



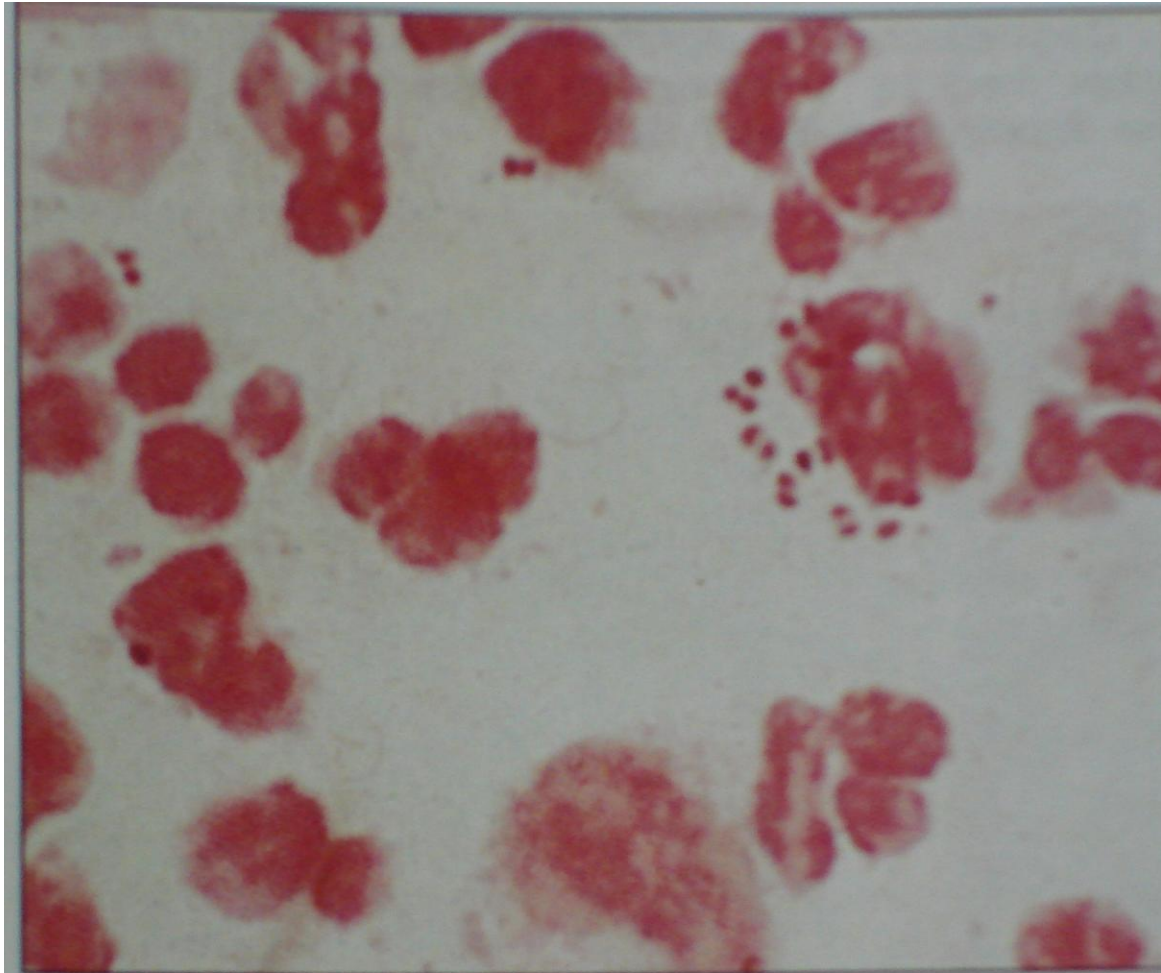
Cl. Perfringens-subterminal spores



Cl. Perfringens

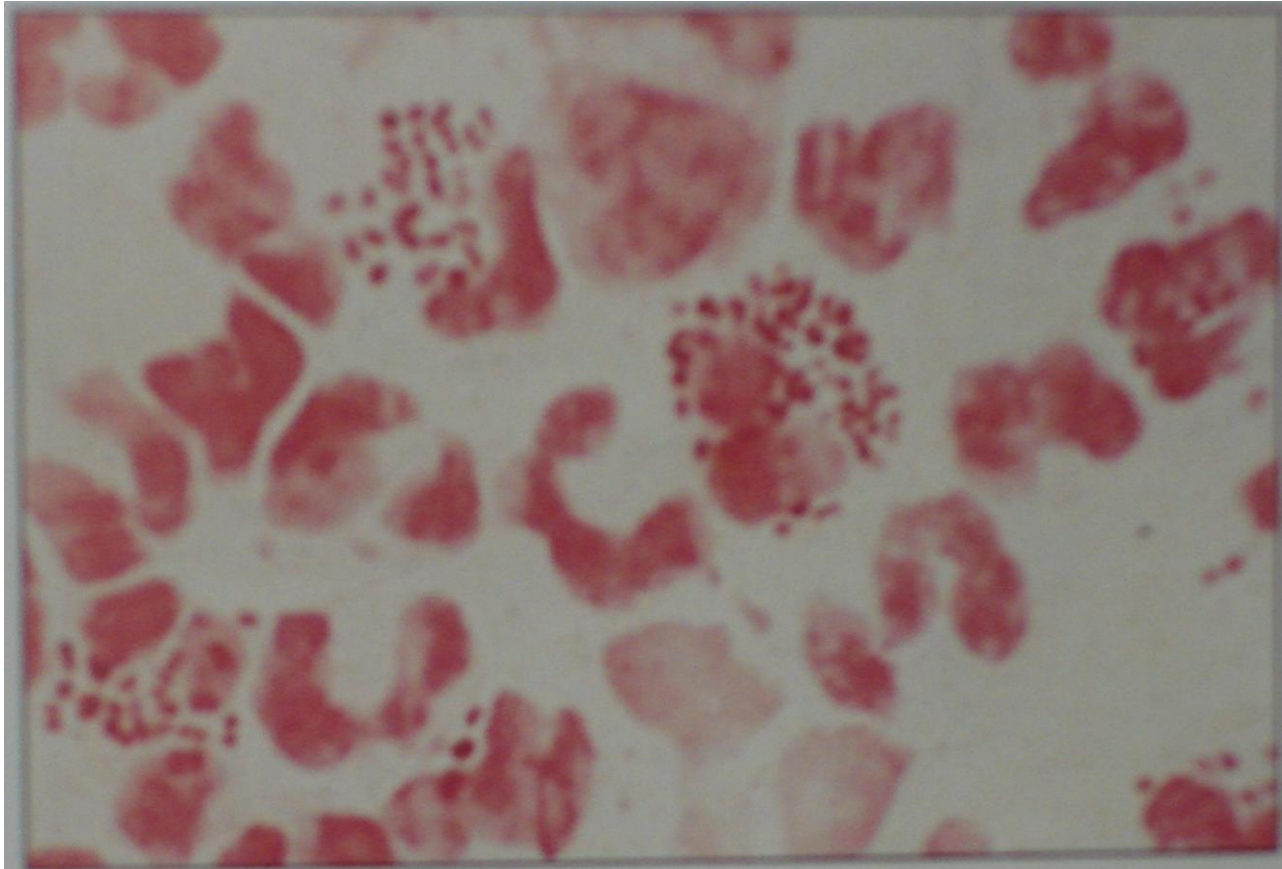


N.meningitidis-Gram Neg. intracellular diplococci



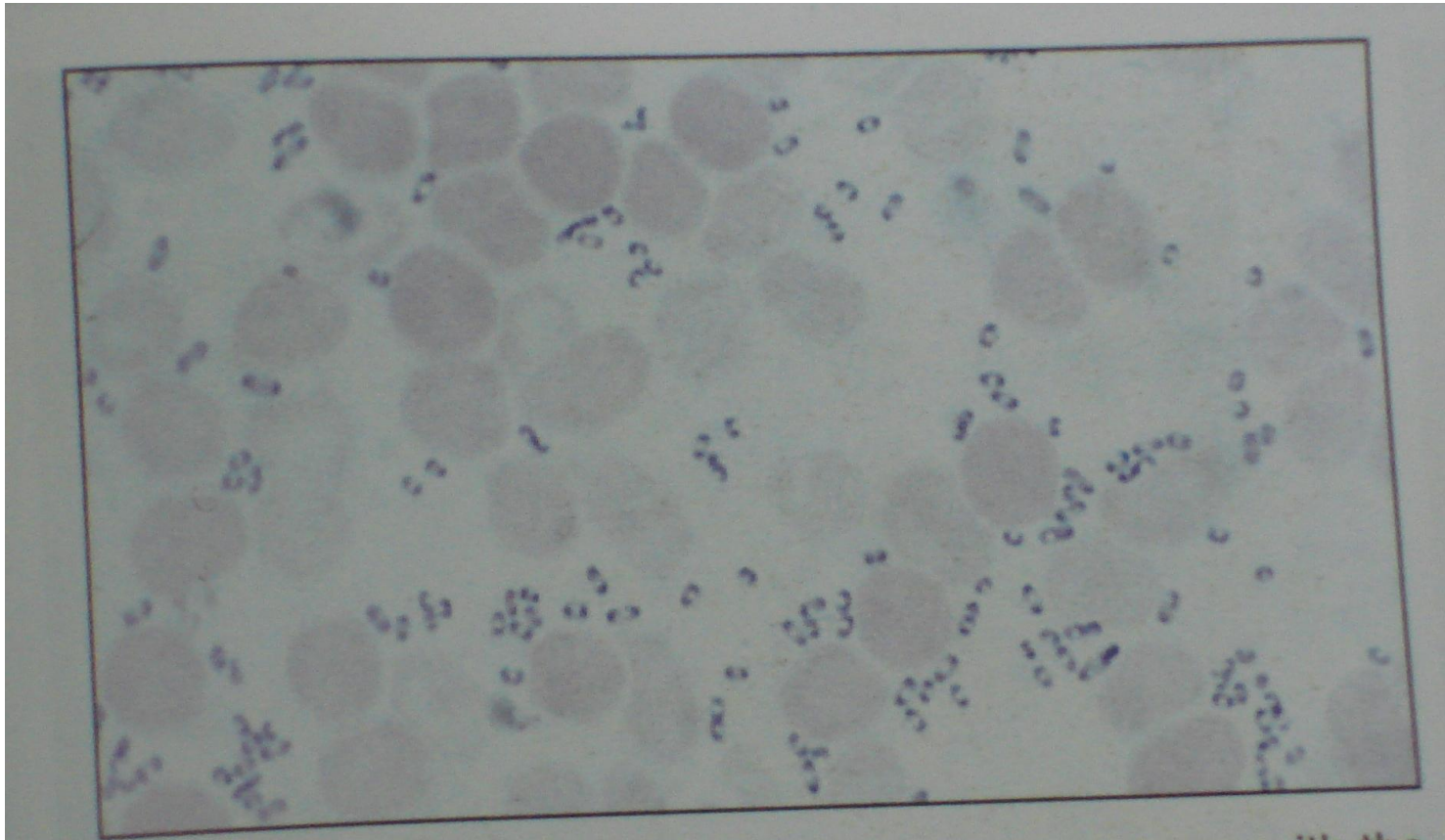
38 Gram stained smear of cerebrospinal fluid showing pus cells and *Neisseria meningitidis* (small intracellular Gram negative diplococci). See 7 18 12

N.gonorrhoeae-Gram Neg. intracellular diplococci



43 Gram stained urethral smear showing pus cells and *Neisseria gonorrhoeae* (intracellular Gram negative diplococci) as seen with the 100 \times objective. See 7.18.13. Note: *N. gonorrhoeae* looks the same as *N. meningitidis* in

Yersinia pestis-Bipolar staining



54 *Yersinia pestis* in Giemsa stained smear as seen with the 100 \times objective. The organism shows bi-polar staining. See 7.18.22.

Cryptosporidium parvum oocysts



End

Thank you for listening to us. I hope we have paid our consultation fee incase we ever meet out there.

ALL THE BEST