1987

False Parasites in Tissue Sections

J. Kevin Baird

*Medical Service Corps, US Navy, Department of Parasitology, us Nova! Medical Research Unit no, 2, Jakarta, jkevinbaird@yahoo.com*

Follow this and additional works at: http://digitalcommons.unl.edu/publichealthresources

http://digitalcommons.unl.edu/publichealthresources/381

This Article is brought to you for free and open access by the Public Health Resources at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Public Health Resources by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.
**Focus False Parasites in Tissue Sections**

J.K. Baird

An accurate histopathological diagnosis of parasitic infections may elude experienced parasitologists and pathologists. The parasitologist is often unacquainted with parasites presented in cross-section, and the pathologist is generally unfamiliar with parasitology. Thus the parasite in tissue sections is sometimes an enigma to those with diagnostic responsibilities.

The histopathological diagnosis of a parasitic infection is often a 'best fit' based on anatomic location, histopathology and geographic location. For example, *Dirofilaria repens* in a subcutaneous abscess from an African patient can be misidentified as *Onchocerca volvulus*. Specific morphological features in tissue sections that would allow an accurate diagnosis are not widely known and not often considered, so it is not surprising that foreign bodies bearing a resemblance to parasites cause confusion. The result is not just misidentification, but a false positive diagnosis of a parasitic infection. Certain types of misidentification occur relatively often; occasionally quite startling errors are made (Figs 1–16, centrefold).

---

**Common Confusion**

Liesegang bodies, the product of diffusing, nucleation, flocculation/precipitation and supersaturation in colloidal solutions, may form in living tissues in the presence of inflammation and/or necrosis and can be confused with nematodes in tissue sections. Their location in the centres of necrosis creates the illusion of cause and effect.
Artefacts in Histopathological Diagnosis of Parasites

Histopathological diagnosis can be a minefield for the unwary. Misdiagnosis can take many forms. Lesions found in living tissues in the presence of inflammation, edema, or necrosis are often confused with neoplastic in tissue sections (Figs. 1 and 2). Diagnosis tends to reflect anatomical location (eg., pulmonary and intestinal in lung, or the gastrointestinal tract in intestinal tract). Serial sections should reveal the spherical geometry of the bodies. Starch grains from a bean in a necrotizing granuloma have also been confused with metastatic eggs (Fig. 3). The non-infectious fungal genus Cryptococcus produces spores that appear in necrotizing granulomas on the surfaces of organs in the pimelid cavity and may be mistaken for eggs of Ascaris lumbricoides (Fig. 4). Spores of the non-infectious fungal genus Aspergillus grow in a spherical shape (Fig. 5), seemingly displacing epithelial cells, nerve fibers, and bundles of retinal vessels. They are, however, about half the size of the smallest mammalian. A spore of wool in an ear wound was diagnosed as a mite (Fig. 6). Besides lacking the morphological features of mites, the splinter but not the parasite would have remained brightly PAS stained (potato starch) because it is not a parasite. A seed in an infected appendix was mistaken for a needletist by a 'pseudococcidian' (Fig. 7). Serial sections reveal size, geometry, and structure. Structures thought to be eggs of Enterobius vermicularis (Fig. 8) in an inflamed fallopian tube led to a diagnosis of enteritis. The tegu's (spp.) are too small, incorrectly shaped and located embryos. Infectious parasites occasionally appear in tissue sections. For instance, parasites occasionally appear in the intestinal tract. Demodex folliculorum and confine it with pathogenic organisms such as Streptococcus species. Ice or schistosomulae of the intestine are rare (Fig. 9) and appear to be ovoid. The magnet is in Fig. 11 with the essential characteristics of an aggregating neurite (cuticle, spines, twisted muscle, and trichal lobules). It is a hard worker Phasmaria and Marasyma phasmaria. The ant, a commonvolent pest, probably wandered into the lymph node soon after ingestion. AIDS patients may suffer several opportunistic infections simultaneously. This can lead to confusion. The intracellular bodies in Fig. 12 were thought to be tachyzoites of Toxoplasma gondii and toxoplasmosis was diagnosed, but they are cystic stages encased in cystomegaly (CHV). The inclusion bodies are nodular, and the cystic bodies of T. gondii are usually yolkiform. A cell infected with CHV (Fig. 13) is actually a cross-section of a female Strongyloides stercolaris. The 'nodule' and 'cystoid' show characteristics of cells infected by CHV. This is a pseudoplasmodium. However, the sleeve of the worm is a long biopsy of a patient with pulmonary cystomegaly and intestinal strongyloidiasis. The nematode (Fig. 14) was actually a cross-section of a female Strongyloides stercolaris. It was really an unknown aquatic metazoan contaminant. Diatoms in the biopsy specimen gave the game away (Fig. 15). A biopsy specimen may cause the tissue to histological changes. Scabies mites (Fig. 16) enter the body from nodules on the skin and become established at the surface of a host. The parasite was diagnosed as an adult Strongyloides stercoralis. Subsequent sections revealed the mites.

Recommends for Histopathological Diagnosis of Parasitic Infections

1. Measure the diameter of the 'parasite' and compare it to known values.
2. Study multiple sections to appreciate the geometry of the object (eg., sphere or tube).
3. Study special stains (eg., PAS stain for plant material).
4. Be familiar with other 'parasites' that may enter such organisms (eg., Entamoeba histolytica, North America would be exceptional).
5. First study a specimen without benefit of clinical history or the opinions of others - decide on the identity of an organism based on its own merits and not on potentially misleading facts.
6. Seek the opinions of others without revealing one's own.
7. Once a diagnosis is rendered, consult a text to check agreement for morphology, life cycle, clinical symptoms and geographic. Compare the general appearance with known sections of the parasite.
8. Many parasites in tissue sections are impossible to identify for a variety of reasons - do not feel uncomfortable with this diagnosis.

Scientific advisor
Dr. K. Baro
US Navy Department of Parasitology, US Naval Medical Research Unit no. 2, Jakarta
Detachment, APO San Francisco 964-3200

9. Section Phasmaria arctica (Ph. a. arctica);
   Errant diagnosis: myiasis

10. Section 5th proboscis (Ph. a. arctica);
    Errant diagnosis: eggs of Schistosoma mansoni

11. Section Phasmaria arctica (H & E);
    Errant diagnosis: nematode

12. Section: cystomegaly in lung (H & E);
    Errant diagnosis: toxoplasmosis of Toxoplasma gondii

13. Section: adult Strongyloides stercoralis (H & E);
    Errant diagnosis: cestodes

14. Microscopic section containing lung (H & E);
    Errant diagnosis: cestodes

15. Diamet from Fig. 14 (H & E)
Non-infectious fungi produce spores that may lead to misdiagnosis. When lycopodium spores are diagnosed as *Ascaris lumbricoides* eggs, patients invariably have a history of laparotomy in the Soviet Union where the spores once occurred in the talc of surgeon’s gloves. Spores of *Helicosporum* may be confused with microfilariae. Plant fibers, seeds and pollen also are a potential hazard. They may appear in almost any organ of man and present bizarre structures in tissue sections that are confused with parasites.

Insect parts occasionally appear in tissue sections. They are usually mouthparts of ticks, mosquitoes or lepidoptera, stings from hymenoptera, or commensal mites. These structures are confused with nematodes, maggots, scabies mites, maggots or helminth eggs.

Patients with acquired immune deficiency syndrome (AIDS) may suffer several opportunistic infections simultaneously. These are sometimes first recognized in tissue sections and misidentified, or as with the scabies mites the true cause of symptoms may be overlooked, and only discovered on subsequent re-examination.

### Avoiding Errors

Although some of the examples given (such as a Pharaoh's ant stumbling into an excised lymph node) are decidedly peculiar, the problem of misidentification is more widespread. To avoid confusion, a set of guidelines should be adhered to (see centrefold). These involve the careful analysis of the size, structure and staining pattern of the 'parasite'. Histopathological investigation should proceed without knowledge of clinical history and outside opinion, and at a later stage advice should be sought without any attempt to influence this advice. On diagnosis, texts should be examined to see if they accord with the characteristics of the parasite and the patient’s condition, and known reference sections of the parasite should be consulted. But finally, at the end of the process, it is no failure to be still unsure of the identity of the parasite.

**References**


Kevin Baird is in the Medical Service Corps, US Navy, Department of Parasitology, US Naval Medical Research Unit no. 2, Jakarta Detachment, APO San Francisco 96356–5000, USA