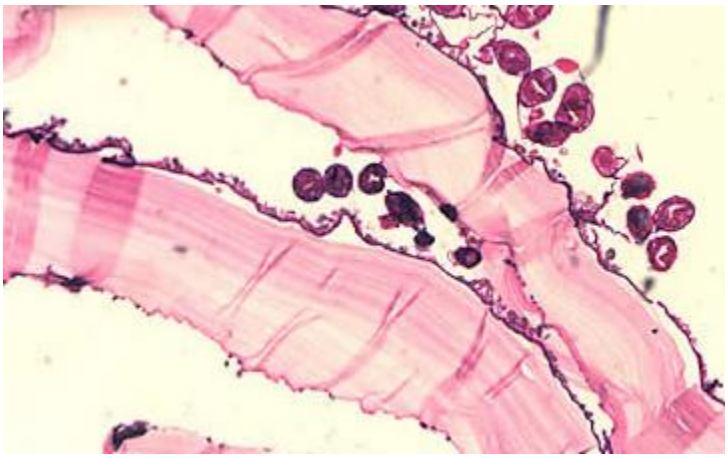
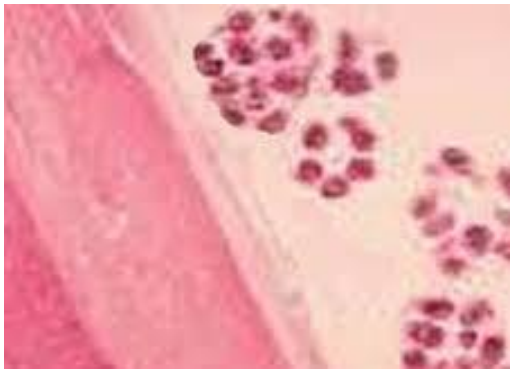
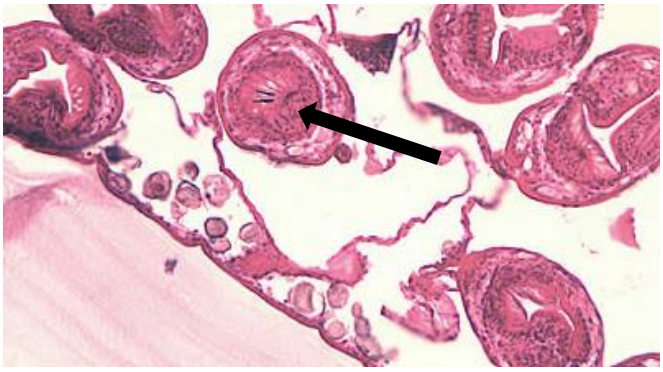
PARASITOLOGY CASE HISTORY 19 (HISTOLOGY)

(Lynne S. Garcia)

A 35-year-old healthy male had a chest x-ray as part of the pre-employment physical requirements. The x-ray demonstrated a cyst-like lesion in the lung. The cyst was surgically removed and submitted to pathology for identification. The cyst measured4-5 cm in diameter. The following images were obtained from hematoxylin/eosin (H&E) stained sections of the cyst. The image in the top row shows the organisms seen using the high-dry objective. The image on the left (bottom row) was also seen using the high-dry objective, while the image on the right was seen using the oil immersion objective. Per his history, he had emigrated from Chile approximately 12-16 months before.







QUESTIONS:

1. What parasitic infections should be considered in the diagnosis?

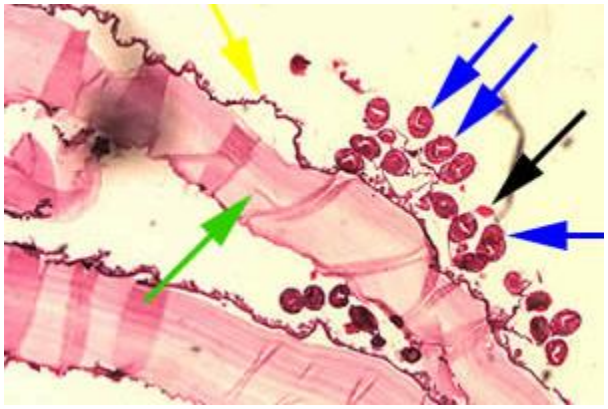
2. Do the images shown above provide a diagnosis?

3. Is his country of origin relevant? Why or why not?

(Scroll Down for Answers and Discussion)

ANSWER AND DISCUSSION OF HISTOLOGY QUIZ #19

The images presented in Histology Quiz #19 are the following:



ANSWERS TO QUESTIONS:

1. Based on the images seen above, the presumptive diagnosis would be hydatid disease with *Echinococcus granulosus*; hooklets from disintegrated protoscolices are visible, as is one protoscolex. The image in the top row resembles some type of segmented helminth (folds in the acellular laminated layer (green arrow) mimic breaks in a chain of proglottids. The yellow arrow identified the thin, germinal (nucleated) inner layer, while the blue arrows show the protoscolices. In the image on the right (above), the black arrow points to the hooklets within the protoscolex.

Various daughter cysts (brood capsules) bud off from the inner germinal layer and may remain attached or float free in the interior of the fluid filled cyst. The individual scolices bud off from the inner wall of the daughter cysts; these protoscolices and free daughter cysts are called hydatid sand. Each scolex will normally invaginate to protect the hooklets. Although not every cyst will produce daughter cysts and/or scolices, this general tissue organization is called a unilocular cyst, in which the cyst contents are held within a single limiting cyst wall. In an early infection, hooklets and/or intact protoscolices may not be visible. There are multiple studies in the published literature that reflect large variability in the sensitivity and specificity of serologic tests, including additional variability between laboratories. Also, 10% to 20% of patients with hepatic cysts do not produce detectable specific serum antibodies (IgG) and thus give false-negative results.

Currently, four species are recognized within the genus *Echinococcus: E. granulosus* which causes cystic echinococcosis (CE), *E. multilocularis* (which causes alveolar disease), *E. vogeli* (which causes polycystic disease), and *E. oligarthrus* (which causes polycystic disease). The areas of the world involved in sheep and cattle raising tend to be the areas where infections with *E. granulosus* are endemic; they even include the Basque sheep farmers in California.

CE represents an increasing public health and socio-economic concern in many areas of the world and is currently considered an endemic zoonosis in the Mediterranean region (MR), in addition to brucellosis, rabies, leishmaniasis and food-borne zoonotic infections. Given a geographic distribution and extent greater than previously believed, several studies have shown that hydatidosis is currently considered an emerging or re-emerging disease. The distribution and prevalence of CE depends on the presence in that country of large numbers of nomadic or semi-nomadic sheep and goat flocks that represent the intermediate host of the parasite, and their close contact with the final host, the dog, which mostly provides the transmission of infection to humans. CE represents an increasing public health and socio-

economic concern in many areas of the world and is currently considered an endemic zoonosis in the Mediterranean region (MR), in addition to brucellosis, rabies, leishmaniasis and food-borne zoonotic infections. Given a geographic distribution and extent greater than previously believed, several studies have shown that hydatidosis is currently considered an emerging or re-emerging disease. The distribution and prevalence of CE depends on the presence in that country of large numbers of nomadic or semi-nomadic sheep and goat flocks that represent the intermediate host of the parasite, and their close contact with the final host, the dog, which mostly provides the transmission of infection to humans.

The number of infections in both animals and humans has decreased over the years as a result of education and various control measures. However, in some areas in Central Asia, figures suggest the surgical incidence is now greater than 10/100,000 (up to 27/100,000 in Tajikistan), and many of the cases are in children and the unemployed. Her travel history is certainly relevant. The risk of infection depends to a high degree on the association between humans and dogs, with the exception of the lion strain. Those at high risk include populations where dogs are used to herd sheep and are also intimate members of the family, often having unrestricted access to the house and family members. Cystic echinococcosis has been recorded in 21 of China's 31 provinces, autonomous regions, and municipalities (approximately 87% of the territory). This infection constitutes one of the major health problems in this part of the world. Hydatid disease caused by *E. granulosus* is a zoonosis of major public health concern throughout Latin America, particularly in the Andean and South Cone regions. Cystic echinococcosis is also widely found throughout the region comprising Arab North Africa and the Middle East.

COMMENTS ON THE PATIENT and INFECTION:

Hydatid disease in humans is potentially dangerous; however, cyst size and organ location will greatly influence the outcome. Clinical symptoms may appear after an incubation period of several months to years. Hydatid cysts should be considered in patients with abdominal masses with no clearly defined diagnosis. Although eosinophilia is present in 20 to 25% of patients, it is merely suggestive. Many asymptomatic cysts are first discovered after radiologic studies. The cyst will usually have a well-defined margin with occasional fluid level markings. These studies can also be helpful in diagnosing osseous involvement. Scans may also demonstrate a space occupying lesion, particularly in the liver. If the cyst is large and located in the abdomen, a thrill is sometimes detected.

COMMENTS ON THE METHOD RECOMMENDATIONS:

Once the cyst is discovered and surgical removal is selected as the approach, some of the cyst fluid can be aspirated and submitted for microscopic examination to detect the presence of hydatid sand, thus confirming the diagnosis. Hydatid sand is not always present. Also, if the cyst is old, the daughter cysts and/or protoscolices may have disintegrated, so that only the hooklets are left. These may be difficult to find and identify if there is debris within the cyst. Cyst aspirates to be evaluated for hydatid “sand” (daughter cysts, protoscolices, hooklets) can be examined as wet direct mounts after centrifugation. Several stains can be used to visualize the hooklets; one of the best is the Ryan trichrome blue modified trichrome stain for the microsporidia. The stained smears can be examined using routine microscopy with transmitted light.

REFERENCE

Garcia, L.S. 2016. *Diagnostic Medical Parasitology*, 6th Ed., ASM Press, Washington, D.C.