



Latin Comparative Pathology Group

The Latin Subdivision of the CL Davis Foundation

Diagnostic Exercise

Case #: 40 Month: January Year: 2014

Answer sheet

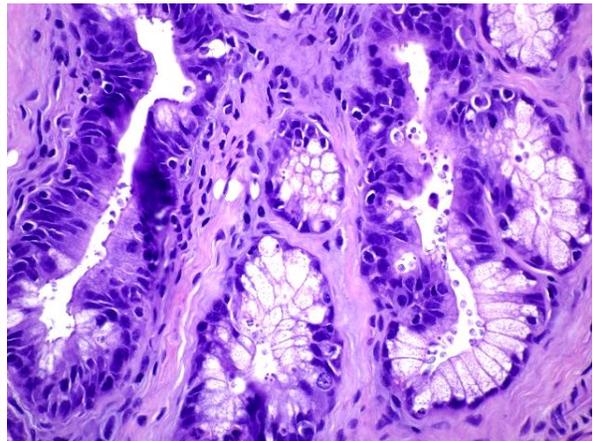
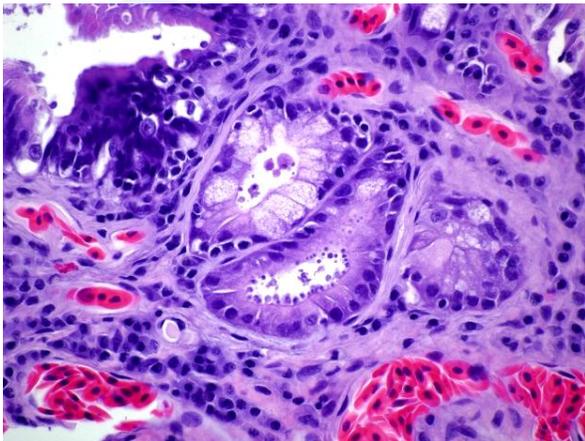
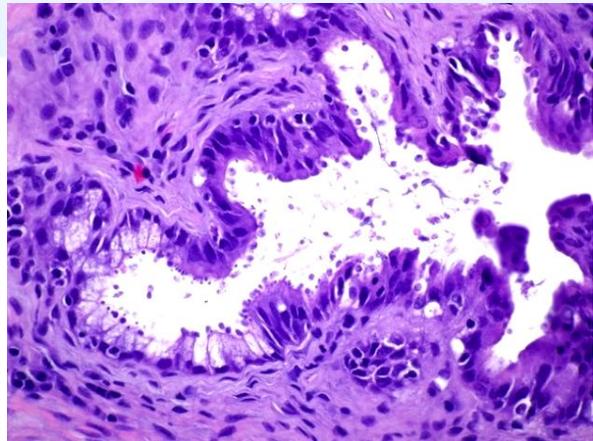
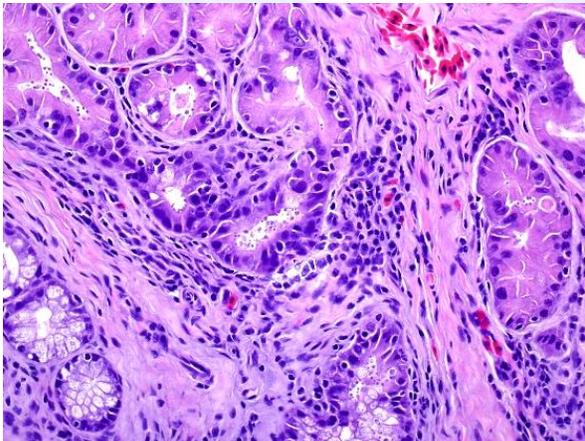
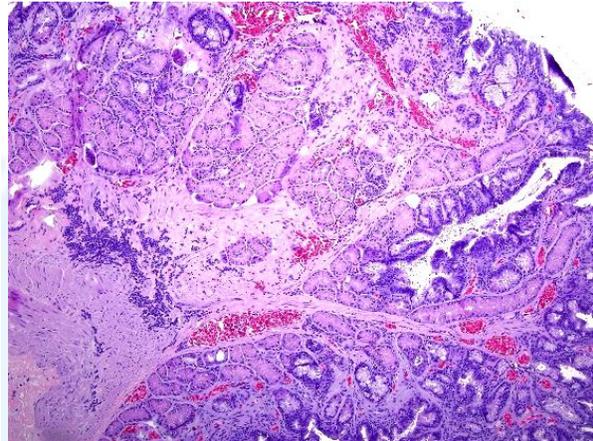
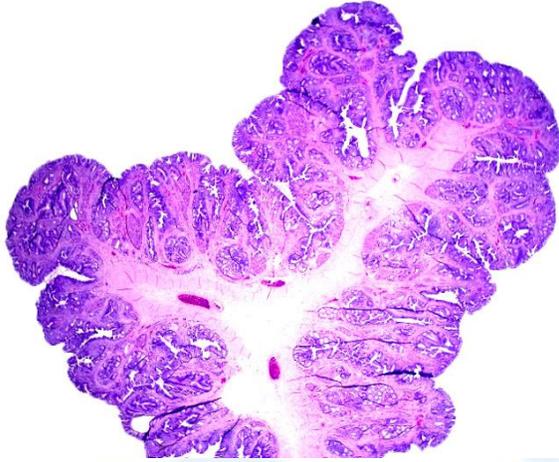
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Clinical History: A 20-year-old, 1.70 kg, 1.88 cm long, female Pacific gopher snake (*Pituophis catenifer*) was presented to the California Animal Health and Food Safety laboratory (CAHFS) in San Bernardino for a full diagnostic work-up. The snake had been housed at a non-for-profit museum in California where it was occasionally handled by the public. It had a history of recurrent mid-coelomic swelling. Cryptosporidia were detected in the feces on repeated testing and it was euthanized due to epizootic concerns and concerns for the other animals in the collection.

Necropsy Findings: Please see the stomach macroscopic changes illustrated below.



Follow-up questions: Macroscopic description, morphologic diagnosis, etiologic diagnosis, etiology, likely histologic findings.



Answers:

1-Describe the gross changes:

Stomach: The gastric wall is diffusely thickened, rough and reddened, with marked longitudinal rugae.

2-Morphologic diagnosis: Gastric hypertrophy and hyperplasia, chronic, diffuse, severe.

[also acceptable: proliferative gastritis].

3-Etiologic diagnosis: Gastric cryptosporidiosis.

4-Etiology: *Cryptosporidium serpentis*

5-Likely histologic findings:

- a. Marked hyperplasia of the gastric wall.
- b. Hypertrophy and hyperplasia of the mucus neck cells that often replace the granular cells of gastric glands.
- c. Presence of *Cryptosporidium* sp. [3-7 µm diameter, round, pale amphophilic protozoa with basophilic nuclei] lining the mucosal surface, the luminal glandular epithelium, and free within the lumen of the gastric glands.

Discussion:

Gastric hypertrophy/hyperplasia, although not pathognomonic, is a lesion often associated with *Cryptosporidium* infection in snakes.^{1,2} *C. serpentis* is considered to be a snake-specific pathogenic infectious organism, rather than associated with consumption of infected prey or other infected reptiles; however, it has also been isolated from lizards and other reptiles.³ Clinical signs and lesions primarily concern the stomach and are chronic, as opposed to in mammals, in which the main lesions are intestinal with the primary manifestation being acute diarrhea. In the present case, the parasite was possibly introduced to the collection by a new snake acquisition. The snake in this case had no microscopic signs of immunosuppression. The diagnosis allowed appropriate health management decisions to be taken for the rest of the reptile collection, and alleviated epizootic and public health concerns. The latter particularly because while *C. serpentis* does not infect humans, other species of *Cryptosporium* sp. may be of zoonotic potential to staff and public. In addition to these changes in the stomach, this snake also had a microscopic diagnosis of hemosiderosis. The etiology of hemosiderosis in the present case is unknown, although it may result from congestion, hemolysis, overexposure to iron, iron storage abnormalities or starvation. It has also been associated with halofuginone treatment of cryptosporidiosis in snakes⁴ (not used in this case).

References:

- 1 Richter B et al (2011) J Vet Diagn Invest 23 (3): 430.
- 2 Valentin A et al (1998) Tierarztl Praxis (Kleintiere) 26: 55.
- 3 Chen F and Qiu h (2012) Parasitol Res 111: 1785.
- 4 Graczyk TK et al (1996) Parasitol Res 82 (2): 143.

Suggested further reading:

Santín M (2013) Clinical and subclinical infections with *Cryptosporidium* in humans and animals. *N Z Vet J* 61 (1): 1-10

Brownstein DG et al (1977) *Cryptosporidium* in snakes with hypertrophic gastritis. *Vet Pathol* 14: 606.

Acknowledgements:

We wish to thank April L. Childress and James Francis Wellehan Jr., of the Zoological Medicine Service, University of Florida College of Veterinary Medicine, for the molecular identification of *C. serpentis*; and Akinyi Nyaoke, Tawnya Rapier, and Paula Yant of CAHFS San Bernardino, University of California Davis for participating in the diagnostic work-up of the case. We welcome any comments on the case; contact email: ploukopoulos@cahfs.ucdavis.edu.

Please send your comments/questions to the whole LCPG list by hitting "reply to all".

A final document containing this material with answers and a brief discussion will be posted on the C. L. Davis website by the end of the current month (http://www.cldavis.org/lcpg_english.html).