A Meller’s chameleon (*trioceros melleri*) is presented to you for necropsy after being found dead with no premonitory signs. Necropsy reveals necrosis of the spleen, liver, kidneys, and adrenals as well as the histopathologic lesions of the hepatocytes pictured below. What is your most likely diagnosis?



Answer: Ranavirus

**PROTEIN ELECTROPHORESIS OF PLASMA SAMPLES FROM BOA CONSTRICTORS WITH AND WITHOUT REPTARENAVIRUS INFECTION**

Christoph Leineweber, Jules Simard, Ekaterina Kolesnik, Tom Hellebuyck, Rachel E. Marschang

J. of Zoo and Wildlife Medicine, 51(2):350-356 (2020)

**What electrophoretogram fraction would you expect to see increase a boa clinically infected with a reptarenavirus?**

1. Prealbumin
2. Albumin
3. Alpha globulin
4. Beta globulin
5. **Gamma globulin**

**In which cell types would you expect to see inclusion bodies in a boid with reptarenavirus?**

Visceral epithelial cells

**DETECTION OF AN ARENAVIRUS IN A GROUP OF CAPTIVE WAGLER'S PIT VIPERS (*TROPIDOLAEMUS WAGLERI*)**

Dietz J, Kolesnik E, Heckers KO, Klingberg MN, Marschang RE

 Journal of Zoo and Wildlife Medicine. 2020 Mar;51(1):236-40.

**What type of inflammation would you expect in the lungs of a viper infected with a reptarenavirus?**

 Heterophilic

Flach, E. J., Dagleish, M. P., Feltrer, Y., Gill, I. S., Marschang, R. E., Masters, N., ... & Wheelhouse, N. M. (2018). Ferlavirus-related deaths in a collection of viperid snakes. *Journal of Zoo and Wildlife Medicine*, *49*(4), 983-995.

**Abstract:** Between June and October 2013, 26 snakes of six viperid species kept in two adjoining rooms died (n = 16) or were euthanized on medical (1) or welfare grounds (9). **Two were from the main zoo collection, but the other 24 had been imported and quarantined for a minimum of 6 mo.** Four of those that died and the single snake euthanized on medical grounds showed minor signs of respiratory disease prior to death, and five were weak, lethargic, and/or poor feeders. Frequent postmortem findings among all snakes were poor body condition (18) and respiratory disease (13). Seventeen cases were examined histologically, and pneumonia, sometimes with air sacculitis and/or tracheitis, was present in 15 individuals. **Lung samples from 24 snakes were ferlavirus polymerase chain reaction (PCR) positive, and one of the two snakes for which only liver was available was also positive**. The negative liver sample was from a snake that died of sepsis following anesthesia for surgical removal of a spindle cell sarcoma. **Correlation with antemortem PCR testing of glottal and cloacal swabs in five cases was poor (sensitivity = 40%).** Immunohistochemistry (IHC) for ferlaviruses on the tissues of 13 PCR-positive cases showed positive labeling in 7 only. Tissues samples from 22 ferlavirus PCR-positive snakes were examined for Chlamydia species by PCR, and 9 were positive, although DNA sequencing only confirmed two of three tested as Chlamydia pneumoniae. Immunohistochemistry for Chlamydia pneumoniae of seven cases (two Chlamydiales PCR positive, one of which was sequenced as C. pneumoniae, plus five negative) confirmed the Chlamydia PCR results. **These two Chlamydiales PCR and IHC positive snakes were ferlavirus PCR positive, but IHC negative suggesting that, even though a ferlavirus was the predominant cause of the outbreak, in a few cases death may have been due to chlamydiosis with ferlavirus present, but not acting as the primary pathogen**.

Question:

Which of the following is true regarding ferlavirus infection in snakes?

1. Intracytoplasmic inclusion bodies are prevalent in the central nervous system
2. Oral swab is the preferred clinical sample for ante-mortem PCR testing
3. Infected snakes may carry the virus asymptomatically for several years
4. The most common finding on gross necropsy is gastric mucosal hypertrophy
5. Snakes of the family Boidae are most susceptible to infection

Ans: C

Distractors:

* A) Inclusion bodies rarely seen with ferlavirus infection; Intracytoplasmic inclusions are prevalent in the CNS in Inclusion Body Disease
* B) Tracheal wash is the preferred clinical sample for ferlavirus PCR
* D) This finding is characteristic of *Cryptosporidium* infection
* E) Large numbers of deaths have been reported in Viperid snakes. Snakes of the family Boidae are highly susceptible to Inclusion Body Disease.

Lindemann, D. M., Allender, M. C., Thompson, D., Glowacki, G. A., Newman, E. M., Adamovicz, L. A., & Smith, R. L. (2019). Epidemiology of Emydoidea herpesvirus 1 in free-ranging Blanding's turtles (Emydoidea blandingii) from Illinois. *Journal of Zoo and Wildlife Medicine*, *50*(3), 547-556.

Abstract**: Herpesvirus infections have been associated with high morbidity and mortality in populations of captive emydid chelonians worldwide, but novel herpesviruses have also recently been identified in apparently healthy free-ranging emydid populations**. Blanding’s turtle (Emydoidea blandingii), **an endangered species** in Illinois, has experienced range-wide declines because of habitat loss, degradation, and fragmentation. **A novel herpesvirus, Emydoidea herpesvirus 1 (EBHV1), was identified in Blanding’s turtles in DuPage County, IL, in 2015.** **Combined oral-cloacal swabs were collected from radio transmitter–fitted and trapped (n = 54) turtles multiple times over the 2016 activity season.** In addition, swabs were collected at a single time point from trapped and incidentally captured (n = 84) Blanding’s turtles in DuPage (n = 33) and Lake (n = 51) counties over the same field season. **Each sample was tested for EBHV1 using quantitative polymerase chain reaction (qPCR).** EBHV1 was detected in 15 adult females for an **overall prevalence of 10.8%** (n =15/138; 95% confidence interval [CI]: 6.2– 17.3%). In radio transmitter–fitted females, there was a significantly higher prevalence of EBHV1 DNA in May (23.8%, n = 10/42) than June (3.6%, n = 1/28), July (0%, n = 0/42), August (0%, n = 0/47), or September (7.7%, n = 3/39) (odds ratio: 12.19; 95% CI: 3.60–41.30). **The peak in May corresponds to the onset of nesting and may be associated with increased physiologic demands.** **Furthermore, all positive turtles were qPCR negative in subsequent months. There were no clinical signs associated with EBHV1 detection**. This investigation is the critical first step to characterizing the implications of EBHV1 for Blanding’s turtle population health and identifying management changes that may improve sustainability.

Question:

A novel herpesvirus, Emydoidea herpesvirus 1 (EBHV1), was identified in Blanding’s turtles (*Emydoidea blandingii*) in Illinois in 2015. An investigation of longitudinal and cross-sectional prevalence of EBHV1 viral DNA shedding using qPCR showed which of the following to be true?

1. Individuals were more likely to be positive in May than any other month.
2. Oculonasal discharge was associated with EBHV1 detection in all turtles.
3. Males had the highest prevalence of DNA shedding in each county.
4. EBHV1 prevalence was lower than EBHV2 in bog turtles (*Clemmys muhlenbergii*).
5. DuPage County was associated with significantly higher herpesvirus qPCR status.

Ans: A

Distractors:

* B) No clinical signs were observed in qPCR positive animals
* C) EBHV1 was detected in 15 adult females
* D) Prevalence was higher than Emydid herpesvirus 2 in bog turtles (10.8% vs 2.9%), mentioned this in discussion
* E) No significant difference was found between the two counties evaluated

Questions:

1. Which of the following is true regarding ranavirus in chelonians?
	1. Almost all animals will show a long course of clinical signs prior to death.
	2. The most common lesions associated with disease include encephalitis and stomatitis.
	3. Higher environmental temperatures are associated with shorter median survival times.
	4. Bone marrow was found to be poor diagnostic sample for PCR to test for ranavirus.
	5. Brain and lung tissue are considered the ideal diagnostic samples for PCR.

Identification of helodermatid adenovirus 2 in a captive central bearded dragon (*Pogona vitticeps*), wild gila monsters (*Heloderma suspectum*) and a death adder (*Acanthophis antarcticus*).

Shemi L. Benge, Timothy H. Hyndman, Richard S. Funk, Rachel E. Marschang, Renata Schneider, April L.Childress, and James F.X. Wellehan Jr.
*Journal of Zoo and Wildlife Medicine*, *50*(1), 238-242, 2019.

**Practice Question**

Although the adenoviruses are generally considered to be “host-specific”, which reptile adenovirus was recently reported in an agamid lizard, a snake, and a Gila monster?

1. Agamid adenovirus 1
2. Helodermatid adenovirus 1
3. Helodermatid adenovirus 2
4. *Snake atadenovirus A*
5. *Siadenovirus*

Answer: C

Prevalence of box turtle adenovirus in eastern box turtles (*Terrapene carolina carolina*) presented to a wildlife rehabilitation center in Virginia, USA.

Franzen-Klein, D., Adamovicz, L., McRuer, D., Carroll, S. A., Wellehan, J. F., & Allender, M. C.

*Journal of Zoo and Wildlife Medicine*, 2019;*50*(4):769-777.

**Practice Question**

Adenoviruses recently sequenced from wild eastern box turtles in Virginia are members of which genus in the family *Adenoviridae*?

1. Ichtadenovirus
2. Aviadenovirus
3. Siadenovirus
4. Testadenovirus
5. Atadenovirus

Answer: D (proposed new 6th gneus)