The dyspneic dragon
SEVPAC May 20-21, 2017
Nicholas Crossland
DVM, DACVP
ncrossla@tulane.edu
Black beard: the dyspneic dragon
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Photo credit:
http://www.beardeddragontime.com/2014/03/bearded-dragon-behavior.html
Signalment:
• Four-year-old male captive central bearded dragon (*Pogona vitticeps*)

Clinical history:
• One week history of increased respiratory effort
  • Open mouth gaping with periods of blackening of the animal’s beard
  • Kyphosis
  • Occasional expulsion of mucoid oral discharge

Husbandry:
• Interpreted as adequate by veterinary staff
• Owner reports no contact with other reptiles during current ownership
Physical exam and hematology findings:

- 5-10% dehydrated; mild hypernatremia and hyperchloremia
- Thin body condition
- **Mild monocytosis** and **mild leukopenia**
- *Toxic changes to heterophil lineage with a left shift

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Value</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monocytes (K/µL)</td>
<td>1.0</td>
<td>0-0.5</td>
</tr>
<tr>
<td>Lymphocytes (K/µL)</td>
<td>2.5</td>
<td>4.0-12.0</td>
</tr>
<tr>
<td>Heterophils (K/µL)</td>
<td>3.8*</td>
<td>1.6-7.3</td>
</tr>
</tbody>
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Clinical intervention and outcome:

- Fluid therapy to correct hydration status
- Administration of antibiotics for presumptive bacterial pneumonia (Ceftazidime and metronidazole)
- Six days into the course of treatment the animal died and was submitted to the Louisiana Animal Disease and Diagnostic Laboratory for postmortem examination
Morphological diagnosis:

• Lung:
  • Interstitial pneumonia, heterophilic and lymphocytic, with pneumocyte degeneration, necrosis, hyperplasia, both intranuclear and intracytoplasmic inclusions, and mixed intraluminal bacteria
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  • Poorly discernible nuclear membrane in virally infected cells
  • Abundant swollen cytoplasmic organelles/vacuoles indicative of pneumocyte degeneration
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- PCR
  - *Adenoviridae, Herpesviridae, Ranaviridae, Paramyxoviridae, and Reoviridae* families
    - Consensus Pan-adenoviral PCR (**DNA-dependent DNA polymerase gene** positive
      - 100% sequence identity to *Helodermatid Adenovirus 2* (HeAdV2) (Genbank #KU936043.1)
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  - Mycoplasmataceae family
    - 16s rRNA gene positive
      - Novel Mycoplasma sp.; 95% homology to M. iguanae: full length 16s rRNA PCR and sequencing pending
Helodermatid adenovirus 2 (HeAdV2):

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• Most recently, HeAdV2 has also been detected from cloacal swabs of **apparently healthy wild Gila monsters** (*Heloderma suspectum*) in North America
Reptilian Mycoplasmosis

• Squamate mycoplasmosis (*M. iguanae* and *M. insons*)
  • *M. iguanae* first isolated from an iguana with bone deformities
  • Experimental inoculation studies of *M. iguanae* failed to incite pathology (I.V. and I.N. inoculation)
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• Tortoise mycoplasmosis (*M. agassizii* and *M. testudinis*)
  • Extensively characterized in natural and experimental disease
  • Fulfillment of Koch’s postulates in URTD, with pneumonia rarely indicated
Case Summary:

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• An extensive diagnostic work up ruled out other viruses associated with reptilian pneumonia
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• Negative aerobic bacteriology results confounded by antibiotic treatment preceding death
• Koch’s postulates have yet to be proven for either of the organisms, stressing the importance of future experimental studies to gain a deeper appreciation for their significance in disease
Q: What do dragons call a knight in shining armor?

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- LSU histology team
- Coauthors
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Photo credit: http://www.reptilesupplyco.com/134-wholesale-reptile-canned-food
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Helodermatid Adenovirus 2 (HeAdV2) vs. Agamid Adenovirus 1 (AgAdv1):

DNA-dependent DNA polymerase gene:
- 66% nucleic acid homology
- 73.8% amino acid homology
Differentials: DNA Viruses

• **Iridovirus** (i.e. Ranavirus and invertebrate iridovirus)
  - Predominantly a dz. of *chelonians* and *amphibians* manifesting in necrotizing stomatitis/pharyngitis and hepatitis with vascular necrosis
  - 120-300 nm non-enveloped virions with icosahedral capsid
  - Basophilic to amphophilic intracytoplasmic inclusion bodies
    - To my knowledge inclusions have never been reported in pulmonary epithelium
  - Koch’s postulates haven’t been fulfilled for *invertebrate iridovirus*

• **Herpesvirus**
  - Predominantly a dz. of *chelonians* manifesting in necrotizing stomatitis with rare instances of hepatitis
  - Large virions >100 nm with enveloped icosahedral capsid
  - Large amphophilic to eosinophilic intranuclear inclusions

• **Adenovirus**
  - 80-100 nm, non-enveloped with an icosahedral capsid
  - Large basophilic and eosinophilic intranuclear inclusions particularly in hepatocytes and enterocytes

(PCR and virus isolation demonstrated the presence of *ranavirus*, *adenovirus* and invertebrate *iridovirus*)
Differentials: RNA Viruses

- **Reovirus**
  - Changes in the lungs, no specific signs, enteropathy and hepatopathy in leopard geckos
  - **Non-enveloped** virions 60 to 80 nm in diameter
  - No reports of inclusion bodies with light microscopy
  - Koch’s postulates have yet to be reported in lizards

- **Paramyxovirus**
  - Respiratory disease most commonly reported in snakes, although CNS disease is also regularly observed
  - Virions are large, ranging in size from 190-420 nm, spheroid or filamentous, and consist of an envelope surrounding the nucleocapsid
  - Koch’s postulates have been proved with pulmonary lesions in Aruba Island rattlesnakes
  - Infections in lizards and chelonians are considered rare