



A Quarterly Publication of the **Arizona Veterinary Diagnostic Laboratory**

From the Director:

Shipping Containers

We have a supply of insulated shipping containers that are quite durable. These are constructed so that one cover flap has our address and the other cover flap can have the address of any laboratory user. Therefore, the boxes can be shipped to us and then we will return them to the owner. We will supply these to anyone who needs them at the low cost of \$15.00 each to encourage better sample preservation and transportation.

After Hours Contacts

We now have a cell phone that is monitored at times when the laboratory is not open. This allows us to respond more expeditiously than our previous system using a pager. The phone number is 520-349-6361. If for some reason you don't receive a response from that number in a reasonable amount of time, please call our office number, 520-621-2356 for additional instructions.

Dr. Robert Glock, Director

Submission Tip:

Our submission forms have an area to check to save the body of animals brought here for necropsy. If this area is checked "yes", we retain the remains after necropsy until they can be picked up by a licensed crematorium or pet burial service. We will also release remains to official government agencies if requested. However, our rules prevent us from releasing remains to private individuals. There are a number of reasons for this and we would be happy to discuss them with anyone who is interested in calling.

We occasionally have people check this category when they are concerned about some legal aspects such as criminal activity or possible litigation. We are unable to provide long-term storage of animal remains. Long-term storage would require a freezer capacity, which we do not have. We are happy to store the remains under refrigeration for several days until arrangements can be made to have them picked up. Discussion with law enforcement and prosecuting attorneys has generally resulted in the agreement that we can dispose of the remains after we have obtained adequate information to conduct our diagnostic investigation. We appreciate your cooperation in preventing a buildup of animal remains in our refrigerators.

Dr. Robert Glock, Director

Submission tip for avian veterinarians: both lead and zinc levels can be determined on approximately one milliliter of heparinized whole blood that should be submitted in a green top microtainer tube. Do not request zinc determination on samples submitted in standard rubber-stopped blood tubes as they are often contaminated by stopper-origin zinc.

Dr. T.H. Noon

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Diagnostic Update

The following are selected samples of cases submitted to the AzVDL during the winter months of December, January, and February.

Bovine



Mycoplasma bovis arthritis was diagnosed in two different groups of cattle. The first were Holstein steers 45 days on feed at a feedlot. Several steers were affected with bilateral rear limb swelling. One died with pneumonia. The second group was composed of two to seven-day-old Holstein calves at a dairy. Large numbers of calves (30%) had joint problems characterized by joint swelling and carpal deformity that was refractory to antibiotic treatment. Post-mortem examination of calves from both groups revealed the same lesions including severe fibrinous arthritis of multiple joints with thick mats of fibrin in the joint space and marked periarticular edema. A few calves also had bronchopneumonia. *Mycoplasma bovis* was isolated from multiple joints of affected calves and from the lungs of calves with concurrent pneumonia.

Mycoplasma bovis was also isolated from four of five samples of pneumonic lungs received from a group of two-month-old Holstein calves with a high incidence of Enzootic Pneumonia. *Pasteurella multocida* was also isolated from all the lungs, and concurrent BRSV infection was detected in one lung by a direct FA test.

Neospora infection of the brain and spinal cord was the cause of scoliosis and inability to stand in a two-day-old Brown Swiss calf. Lesions included marked atrophy of the ventral horns and ventral white matter of the cervical spinal cord with multifocal nonsuppurative myelitis and protozoan cysts. Severe atrophy of muscles on the right side of the neck was present. Mild, multifocal encephalitis and protozoal cysts were found throughout the brain. The protozoa were identified as *Neospora* by the immunoperoxidase method.

A severe outbreak of **acute catarrhal gastroenteritis** rapidly followed by **bacterial septicemia** and death was observed in seven to ten-day-old calves in a Central Arizona "calf ranch." An increased incidence of post-arrival diarrhea due to *E. coli*, *Cryptosporidium* sp. and/or Rotavirus, led the owner to mass-medicate the calves with antibiotics for several days. An explosive outbreak of severe diarrhea with acute death losses (less than 24 hours after the onset of diarrhea) followed the discontinuation of the antibiotic treatment. Enteritis and bacterial septicemias by mixed enteric bacteria (*E. coli*, *Klebsiella* sp.) highly resistant to antibiotics were the laboratory findings. It is believed that

the elimination of susceptible normal flora by the mass medication led to the unchecked multiplication of the resistant, potentially pathogenic enterics that led to the death of the calves. Nutritional deficiencies such as hypoproteinemia and low to marginal levels of selenium and vitamin E, very common in this type of calves, were also observed in this group and most likely contributed to the severity of the outbreak.

An acute bronchointerstitial pneumonia produced by *Hemophilus somnus* infection was the cause of death of a newly arrived steer at a southern Arizona feedlot. The lesions appeared to result from the reactivation of a chronic purulent pneumonia with extensive fibrosis. No other bacterial pathogens were isolated from the chronic lesions.

Equine



A fourteen-year-old Appaloosa mare had a 48-hour history of "going downhill", confusion, and inability to eat progressing to recumbency and death. The mare had developed a chest swelling ten days prior to death that the owner was monitoring as a suspected *Corynebacterium pseudotuberculosis* abscess. At necropsy, a five cm diameter abscess containing yellow purulent fluid was present in the subcutis of the anterior pectoral area. A 0.5 cm abscess was present in the subcutis of the right withers area. The kidneys contained scattered, white, cortical foci with red rims. Histologic lesions included multifocal suppurative nephritis, a mild, multifocal necrotizing hepatitis, and a mild, subacute meningoencephalitis. *Corynebacterium pseudotuberculosis* was cultured from the abscesses and brain.

Avian



Probable mite infestation of the pulmonary airways was diagnosed in a four-and-a-half-year-old female Blue Rumped Parrotlet. The parrotlet was found dead. At necropsy, there were no gross lesions and microscopic examination of sections of the lung revealed flooding of tertiary parabronchiolar lumens with eosinophilic fluid along with a few intraluminal arthropod cross sections that were suggestive of mites.

A seven-month-old Silkie hen died following a five-day history of paralysis of the left leg. Gross lesions included emaciation and the presence of a 4.0 cm diameter, white fleshy mass in the area of the ovary. Microscopic lesions were those of malignant lymphoma affecting the ovary, liver,

kidney, adrenal glands, small intestine, and pancreas. Large numbers of lymphoid cells infiltrated the right sciatic nerve and nerves in the serosa of the intestinal tract. Collectively, the lesions were consistent with **Marek's disease**.

Megabacteriosis was the cause of chronic proventriculitis and death in an English parakeet and a Long-tailed Grass finch. Both birds died unexpectedly without prior signs of illness.

Psittacine proventricular dilatation syndrome was diagnosed in a fifteen-week-old, female, African Grey parrot that died following a 24 hr history of having blood in its droppings. Gross lesions included dilation of the proventriculus and ventriculus with a few linear hemorrhages in the mucosa of the proventriculus. Histologic lesions were typical of this syndrome and included a lymphoplasmacytic ganglioneuritis of the proventriculus, ventriculus, crop, small intestine, and epicardium. Mild encephalitis was seen in the brain.

A female parrotlet was presented with a history of having come from a facility that had previous problems with tuberculosis. There were multiple inflammatory foci with accumulations of mononuclear cells in the liver, kidney, and intestine. **Avian tuberculosis** was diagnosed on the basis of identification of numerous acid-fast organisms.

Rupture of the proventriculus due to transmural necrosis from extensive fungal and bacterial colonization was diagnosed in a Sun Conure. The abdominal air sac contained considerable food-like material. A linear rupture was found in the wall of the proventriculus. Microscopic examinations of sections of the proventricular rupture revealed fungal colonization with invasion and thrombosis of blood vessels.

Lesions compatible with **proventricular dilatation syndrome** along with **hepatocellular hemosiderosis** was diagnosed in an eight-year-old male Umbrella cockatoo that had appeared to be healthy but was found dead. At necropsy, there were no gross lesions. Microscopically, there were prominent perivascular accumulations of lymphoid and plasma cells, as well as macrophages and rare heterophils in the proventriculus, ventriculus, and the brain. "Prominent accumulations of brown, granular, iron-positive pigment were in the cytoplasm of most hepatocytes. Testing of formalinized liver tissue revealed an excessive amount of iron (653 ppm).

Feline



Severe necrotizing omphalitis due to group G *Streptococcus* infection with an associated suppurative peritonitis was diagnosed in a four-day-

old Bengal feline kitten. The kitten was part of a litter of seven, of which five had died and two were sick. Necropsy revealed a swollen, discolored umbilicus, and diffuse reddening of the serosa of the intestinal tract, along with opaque exudate in the abdominal cavity. Microscopic examination revealed extensive gram-positive coccoid bacterial colonization of the umbilicus and the peritoneal membranes, along with extensive inflammation. Cultures of umbilicus and peritoneal exudate yielded growths of group G *Streptococcus*.

Feline parvovirus infection was diagnosed in a male American Shorthair feline that was submitted by a county animal control agency. The animal had been adopted and returned dead by its owner who claimed that it died of distemper. Necropsy and microscopic examinations revealed typical lesions of feline parvovirus infection (a.k.a. feline distemper, feline enteritis, feline panleukopenia) although electron microscopic examination of the gut contents was negative for viral particles.

A five-year-old castrated male cat was submitted for surgery to remove gastric foreign bodies. The cat died while under anesthesia. The death was attributed to extensive **cardiomyopathy** with mild fibrillar degeneration and scattered infiltration of inflammatory cells. There were also areas of fibrosis in the myocardium.

Canine



Thrombosis of the iliac arteries at the bifurcation of the aorta was diagnosed in an eight-year-old Whippet that had an approximately three-month history of "non-specific weight loss and decreased appetite". About three weeks prior to its death, the dog developed splenomegaly and a heart murmur, and a clinical pathology workup revealed a bilirubinuria, anemia, and thrombocytopenia. Treatment was initiated with prednisone and the dog was subsequently presented "acutely down, no pulses in either rear limbs" along with considerable pain in the pelvic region. At necropsy, the spleen was enlarged and the dissection revealed a firm, pale thrombus adherent to blood vessel walls at the bifurcation of the aorta into the proximal iliac arteries. Microscopic examination of a section of the thrombosed aorta revealed an acute arteritis as well. Thrombosis of splenic arterioles was evident along with erythrophagocytosis. Endocardiosis was evident in the right atrial ventricular valve and may have been responsible for the murmur noted clinically.

Hemangiosarcoma of the right atrium of the heart accompanied by hemorrhage into the pericardial sac was diagnosed in a six-year-old spayed female German Shorthair pointer that died a few hours after being found down by its owner.

Hemangiosarcoma of the lateral ventricle of the left cerebral hemisphere was found in an eight-year-old spayed female canine that developed grand mal seizures, one of which lasted for thirty minutes. Upon presentation, the dog was noted to be ataxic and had hepatomegaly and congestion of the scleral vessels.

Aldicarb intoxication was diagnosed at necropsy in an adult male Rottweiler mix that was submitted by a county animal control agency. The dog's stomach contents were watery and contained a few chunks of chicken-like ingesta. Testing of brain tissue revealed subnormal acetylcholinesterase activity (1.13 mg/min/g) suggesting that exposure to organophosphate or carbamate-like compounds had occurred. Infrared spectrophotometric analysis of the stomach contents was positive for Aldicarb, which is a carbamate insecticide.

Severe, chronic, fibrosing pericarditis with adherence to the epicardial surface of the heart was found in a two-year-old male Labrador that had a "history of seizures." The dog died at home. The necropsy revealed a thickened pericardial sac that was adherent to the epicardial surface of the heart. The cause of death in this case was likely to have been impaired cardiac function from a restrictive pericarditis. An etiologic agent was not found but in our experience, past cases of this type have been due to *Coccidioides immitis* infection. A recent article concerning this form of coccidioidomycosis was published by Dr. Lisa Shubitz of the University of Arizona Department of Veterinary Science along with several of the AzVDL diagnosticians. It can be found in the February 15th, 2001 issue of the Journal of the American Veterinary Medical Association.

Myocarditis due to gram-positive bacterial infection was found in the septum of the heart of a six-year-old female Boxer. The owner reported that the dog died following a sudden onset of lethargy. Necropsy lesions included a large elliptical (approximately 2 cm diameter) cavitated lesion in the septum of the heart adjacent to the aortic valve. Thickening and discoloration of the adjacent aortic valve leaflets was also noted. Microscopically there was locally extensive necrosis of myocardium with prominent colonization of the septal lesion with gram-positive cocci. The adjacent aortic valve leaflets were inflamed. Emboli of gram-positive cocci surrounded by infiltrates of neutrophils were found in blood vessels in the renal medulla. Bacterial embolization was also noted in the spleen, exocrine pancreas, adrenal cortex, and mesenteric lymph node.

A four-year-old, spayed female, Yorkshire terrier died while under anesthesia for dental prophylaxis. Gross lesions included a remarkable dorsal-ventral flattening of the trachea. The dorsal membrane was redundant and flaccid resulting in collapse of the lumen from the larynx to the tracheal bifurcation. Although an endotracheal tube was in place during the procedure, it was presumed that the trachea dis-

tal to the end of the tube collapsed during the procedure resulting in hypoxia. . **Collapsed trachea** is a condition of toy breeds. The gross lesions in this case are typical. The histologic change is that of hypocellular areas of tracheal cartilage with tinctorial changes in the intercellular matrix (eosinophilia) suggesting that the defect is in the cartilage but the cause is unknown. This dog had a prior history of 'a little choking once in awhile' that had been diagnosed by a previous veterinarian as reverse sneezing but there was no history of the dramatic 'goose honking' cough typically associated with this condition.

A two-year-old, male Great Dane collapsed and became unconscious following a several day history of ataxia and anorexia. The dog was euthanized. At necropsy, there was severe bilateral adrenal cortical atrophy and lymphoplasmacytic adrenalitis consistent with **hypoadrenocorticism (Addison's disease)**. Other gross lesions included marked atrophy of the head and axial muscles.

Infectious canine hepatitis (canine adenovirus type I) was diagnosed in two different, unrelated litters of stray four and six-week-old puppies, one from the Phoenix area and one from Tucson. Clinical signs included anemia, thrombocytopenia, and terminal neurologic signs. Gross lesions were restricted to petechiae in the thymus. Microscopically, there was multifocal hepatocellular necrosis with intranuclear inclusion bodies. Intranuclear inclusion bodies were common in endothelial cells of the lung, kidney, heart, adrenal gland, and brain. The infection was confirmed by PCR.

Ehrlichia canis infection was confirmed by PCR analysis of formalin fixed tissue collected at the necropsy examination of two dogs with characteristic lesions. Neither dog had ante-mortem serologic testing performed. The first dog, an eleven-month-old Akita died with an acute bacterial septicemia (*Pseudomonas aeruginosa* and group G *Streptococcus*) following a seven-month history of illness characterized by cyclic thrombocytopenia. Treatment included phenobarbital and prednisone. Necropsy lesions included foci of suppurative inflammation and hemorrhage in multiple visceral organs consistent with septicemia but also present were lesions suggestive of chronic *E. canis* infection including non-suppurative meningitis and plasmacytosis in the bone marrow, spleen, and lymph nodes. Megakaryocytic aplasia was found in the bone marrow. The second dog was a seven-year-old, neutered male, shepherd mix that was euthanized following a two-week history of illness characterized by seizures, pyrexia, leukocytosis, severe azotemia, hypernatremia and hypokalemia. Necropsy findings included moderate, non-suppurative encephalitis and acute tubular nephrosis. In both instances, the PCR test was an essential diagnostic tool since there are no pathognomonic lesions of *E. canis* infection, only those suggestive of it. Our laboratory also offers PCR testing for this agent

on whole blood (5ml lavender-top).

A two-year-old mixed breed dog had a history of vomiting and anorexia followed by ataxia and recumbency. No significant lesions were observed grossly but there was extensive **granulomatous meningoencephalitis**. This disease is seen periodically in dogs and remains idiopathic.

Group G *Streptococcus sp.* infections continue to be a common cause of primary and secondary severe septic conditions in dogs in Arizona. Four unrelated cases of septicemias and six cases of pneumonias produced by group G streptococci were observed in necropsied dogs during the present reporting period. In addition, these agents were isolated from two cases of ear infections and one case of conjunctivitis.

A **portosystemic hepatic shunt** was the cause of death of a two-year-old female Pug which was lethargic, anorexic, with excessive panting, ataxia and possible seizures within a couple of days after surgery for the removal of an inflammatory mass in a paw. Histologic lesions in the liver included small (or sometimes absent) portal veins in the triads, multiple hepatic arterioles within the triads and in the hepatic lobules, and small bile granulomas. There was neuronal necrosis and pulmonary edema with low-grade inflammatory changes.

Exotics



Systemic microsporidiosis was diagnosed in a bearded dragon. The bearded dragon was presented to the veterinarian with a history of anorexia and lethargy of four weeks duration.

The primary concern at the time of presentation was possible adenoviral disease. Microsporidial organisms were seen associated with severe granulomatous inflammation within the liver, kidney, lung, and spleen. Systemic microsporidiosis has been recently identified as an emerging disease in the inland bearded dragon, a popular pet reptile. Microsporidia are obligate intracellular protozoal parasites. *Encephalitozoon* and *Pleistophora* are the most common microsporidia currently associated with disease of amphibians and reptiles. The specific genus and species was not determined in this case.

Cryptosporidiosis and **adenovirus** infections of the small intestine were found at necropsy in a Salvador monitor with a two-month history of illness.

Hemopericardium resulted in the acute death of a 4-month-old captive javelina. The hemorrhage was precipitated by a severe, acute purulent pneumonia with fibrinopurulent pericarditis, pleuritis and peritonitis caused by a *Pasteurella multocida* infection.

Wildlife



Gunshot was diagnosed as the cause of death in a cormorant that was among several birds found dead in a wetland around a wastewater treatment plant. Illegal shooting of the birds was suspected. Radiographs revealed twenty-six small shotgun pellets and one small caliber bullet-like projectile in the bird's tissues. Several of the shot and the bullet were recovered for law enforcement use.

Hemosiderosis of the liver was diagnosed in an adult Great Horned owl that had been presented in a severely emaciated state. The bird was found dead the following morning. There were no significant gross lesions and microscopically there were prominent accumulations of brownish, iron-positive pigment in the cytoplasm of most hepatocytes. Screening for pesticides and lead was negative.

Chytridiomycosis, a recently recognized fungal dermatitis of wild and captive frogs, was again diagnosed in several ranid species in multiple locations throughout southern Arizona this winter. Large-scale mortalities and some extinction in wild amphibian populations of Central America, Australia and Spain have been attributed to this newly identified pathogen, *Batrochochytrium dendrobatidis*. The infection has also been responsible for large-scale mortalities in some native species of Arizona frogs including the lowland leopard frog (*Rana yavapaiensis*) and the Chiricahua leopard frog (*Rana chiricahuensis*) during the last several winter seasons. Similar mortalities have occurred recently in threatened populations of the Boreal toad in the Rocky Mountains.

Arizona Veterinary Diagnostic Laboratory
Access to the AzVDL: Take Tucson Interstate 10 to the Miracle Mile exit #255. Travel approximately 1/4 mile on the south bound frontage road between Miracle Mile and Grant Rd. Turn west onto the farm at the signed entrance.

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Two juvenile coyotes from the Sun City area were diagnosed with **parvovirus enteritis**. Seven other coyotes had been found dead in the area at about the same time.

Herpesvirus infection characterized by necrotizing hepatitis, splenitis, and esophagitis with intranuclear inclusion bodies was found in a Great horned owl from the Casa Grande Ruins National Monument. This was the second dead owl found at the site this year.

An adult female coyote was presented to a rehabilitation center with vulvar bleeding. She had a PCV of 10.5% and died soon after admission. The findings at necropsy included blood in the intestinal tract and the bladder. There was also some hemorrhage retroperitoneally around the kidneys. **Brodifacoum** was found in the liver at the level of 1389 ppb. This is a very high level.

Comments on Diagnostic Update can be directed to Dr. Greg Bradley via e-mail at: azvdl@ag.arizona.edu compiled by Greg Bradley, Bob Glock, Carlos Reggiardo, T. H. Noon, Sharon Dial, and Barbara Hiers

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