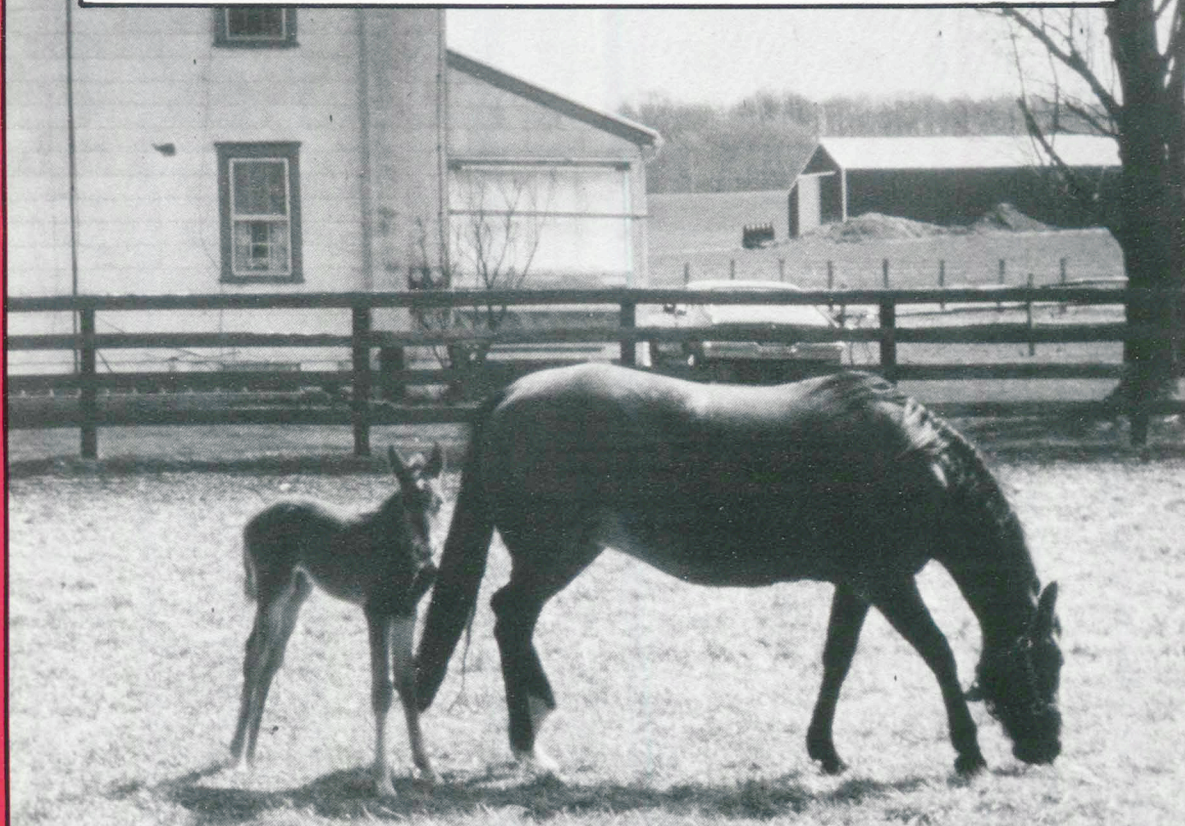


# VETERINARY MEDICAL REVIEW



## *Tyzzler's disease in foals*

University of Missouri-Columbia  
College of Veterinary Medicine and  
Cooperative Extension Service

November/December 1982, N.S., Vol. 3, No. 6  
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a look at a zoo veterinarian's job, p. 6.

# Tyzzer's disease in foals

Diagnosis is  
challenging;  
treatment  
unrewarding.

Kim Waggle, D.V.M.  
Larry P. Thornburg, D.V.M., Ph.D.  
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Department of Veterinary Pathology

Tyzzer's disease was named after E. E. Tyzzer, an early pioneer in tumor transplantation research. In 1917, Tyzzer published an account of an epizootic that nearly wiped out his entire colony of Japanese waltzing mice. The mice either developed a watery-to-pasty diarrhea and died 24-48 hours after the onset of symptoms, or died suddenly without prior signs. At necropsy, the livers enlarged and contained multiple white foci 1-2 mm in diameter on the surface and in the parenchyma. Tyzzer was unable to culture a causative agent, but, on microscopic exam, demonstrated pleomorphic intracellular, spore-forming bacteria in viable hepatocytes bordering foci of necrosis in the liver. These bacteria ranged in length from 4-25  $\mu$  and were, on the average, .5  $\mu$  thick. Similar bacilli could be demonstrated in epithelial cells of the cecum, colon, and, to a lesser extent, the lower small intestine. On the basis of morphology, Tyzzer named the organism *Bacillus piliformis*. The name "bacillus" is probably a misnomer—the organism stains faintly gram-negative rather than gram-positive as do true members of the genus *Bacillus*. However, the biology of this bacterium is not well-known, and so Tyzzer's original name has been retained. At present, diagnosis of Tyzzer's disease usually is based on the histologic demonstration of this organism within host cells.

Tyzzer's disease was considered to occur exclusively in mice until 1965, when it was diagnosed in New Zealand white rabbits. Since then it also has been reported in cottontail rabbits, rats, hamsters, guinea pigs, gerbils, rhesus monkeys, dogs, cats, foxes, coyotes, and muskrats. The increasing number of reports probably is due to increased recognition of the disease. For example, Errington's disease, first reported in muskrats in 1946, recently has been demonstrated to be synonymous with Tyzzer's disease.

The first case of Tyzzer's disease in horse foals was reported from Kentucky in 1973. Published accounts have since come from 10 other states, Canada, and England. Affected foals have ranged in age from 7-42 days. There has been no apparent breed or sex predilection. Clinical histories have consisted of sudden death without prior signs of illness, or a sudden onset of depression shortly followed by convulsions and death. Diarrhea also has been seen prior to death in a few

cases.

Between May 12 and June 23, 1981, three cases of equine Tyzzer's disease were diagnosed at the University of Missouri Veterinary Medical Diagnostic Laboratory. In one instance (a 1-week-old filly), the animal was found dead in pasture. No gross lesions were observed upon necropsy examination, and formalin-fixed tissues were submitted to the diagnostic laboratory for histologic evaluation. In the other two cases (a 1-month-old Appaloosa filly and a 1-month-old QH-Appaloosa cross colt) the foals were observed to have convulsions and were comatose prior to death. Hematology and clinical chemistries obtained from the colt prior to its death revealed a severe leukopenia accompanied by a left shift, hyperfibrinogenemia, elevated liver enzymes, and hypoglycemia. Other values including erythrocyte count and PCV were normal. At necropsy examinations, the two older foals had hemorrhages in numerous organs including the intestinal serosa and mesenteric lymph nodes. In addition, the colt was icteric and multifocal areas of necrosis, approximately 1 mm in diameter, were observed in the parenchyma of its liver (See Figure 1).

Microscopically, the livers of all three animals contained multiple foci of hepatocellular necrosis. These foci were distributed periportally in two cases and diffusely in the third. Varying degrees of a mixed inflammatory cell infiltrate were present within the necrotic foci and there were erythrocytic effusions into some of the lesions. Intracellular bacteria were not visible within the hepatocytes bordering these foci in hematoxylin and eosin-stained sections. However, in Warthin-Starry silver-stained sections, numerous bundles of rod-shaped bacteria were present within these hepatocytes in the livers of all three foals.

The pathogenesis of Tyzzer's disease is not well understood. *Bacillus piliformis* is a spore-forming organism. The spores have been demonstrated to survive in infected bedding at room temperature for at least one year and for at least five years in areas in which epidemics of Tyzzer's (or Errington's) disease had occurred in the wild muskrat population. It is believed that the spores are shed in the feces of infected or carrier animals from either the wild or domestic populations. When the spores are ingested by a susceptible host, they germinate in the lower small intestine, cecum, and/or proximal colon. The vegetative phase multiplies within the intestinal epithelial cells and, from there, invades the lymphatic and vascular channels. The organism is carried to the liver, in-

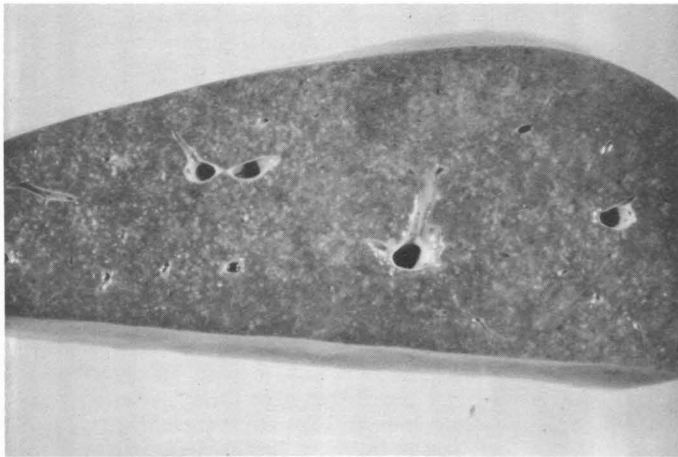


Figure 1: Section of infected liver demonstrating multiple foci of necrosis.

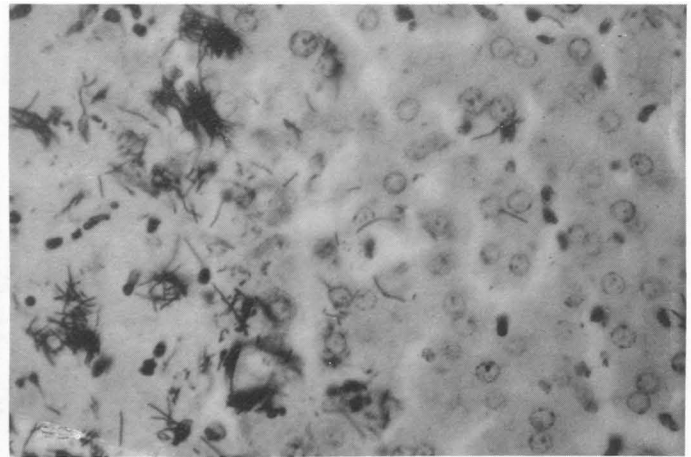


Figure 2: Typical nests of *Bacillus piliformis* within hepatocytes bordering a necrotic focus in the liver (x400).

vades the hepatocytes, and probably spreads through cell-to-cell contacts.

In cases of equine Tyzzer's disease, little pathology of the intestinal tract has been observed. Serosal hemorrhages may be present on surface of the intestines. The mesenteric lymph nodes are usually edematous. Microscopically, there may be a nonspecific cecitis and colitis, and the glandular crypts may be distended with mucus and inflammatory cells. *Bacillus piliformis* has not been described within the intestinal epithelial cells in any of the equine cases to date.

Gross and microscopic lesions found in Missouri horses were similar to those previously reported. The amount of inflammatory cell infiltrate present is related to the age of the lesion. As age of the hepatic lesions increase, the amount of inflammatory cell infiltrate also increases and the numbers of bacilli in hepatocytes bordering the lesions decrease. In laboratory species, in which the course of the disease has been more thoroughly studied, healing of the liver lesions has been found to occur by fibrosis. Multinucleate giant cells may be seen at the periphery of the healed lesion and there may be mineralized deposits within the fibrotic area.

Another organ in which lesions attributable to *Bacillus piliformis* have been found is the heart. These lesions have been described in several species, including one foal. Grossly, they appear as white streaks in the myocardium of the left ventricle. Microscopically, these are areas of necrosis surrounding or adjacent to myocardial blood vessels. Cardiac muscle cells bordering the necrotic foci contain typical bundles of rod-shaped bacteria.

The factors influencing susceptibility to Tyzzer's disease in foals have not been determined. Most foals dying of the disease previously had been in good health and condition. In one report, two of four Arabian foals dying of Tyzzer's also had combined immunodeficiency disease. Tyz-

zer's does not appear to be highly virulent since in most cases only one foal from a herd has died of the disease. In other species, susceptibility has been associated with concurrent disease, overcrowding, cortisone administration, irradiation, genetic factors, and B-cell deficiency.

Diagnosis of Tyzzer's disease presents a challenge. Important clues include a history of sudden death or death following convulsions or coma in foals 1-6 weeks of age. If clinical chemistries are available, they usually will show leukopenia and elevated hepatic enzyme levels. Gross pathology, especially multiple foci of necrosis 1-3 mm in diameter in the liver, is suggestive; however, foals may die of Tyzzer's disease without exhibiting gross lesions. Impression smears from a suspect liver may be stained with methylene blue in an attempt to demonstrate the bacillus (the organism stains only faintly with gram stains). Care must be taken in order to distinguish *Bacillus piliformis* from invading gut anaerobes. This is most easily accomplished by looking for organisms in a characteristic "nest" arrangement.

The best diagnostic method currently available for Tyzzer's disease in foals is the histologic demonstration of the causative bacteria within hepatocytes bordering foci of liver necrosis. Only rarely will the organisms be seen in hematoxylin and eosin or gram-stained sections. *Bacillus piliformis* is well-stained by silver impregnation techniques even when present in low numbers. Because of this, silver stains such as the Warthin-Starry or Dieterle are the stains of choice for demonstrating the bacillus in tissue sections (see Figure 2). Ultrastructurally, a distinguishing characteristic of *Bacillus piliformis* is the presence of peritrichous flagella. The vegetative phase of the organism is highly unstable and begins to autolyze shortly after the death of the host. Therefore it is imperative that tissue samples be taken as soon as possible after the animal's death.

Supportive tests, such as culture for bacterial pathogens, virus isolation procedures, and serologic techniques are important to help rule out other microorganisms as the cause of disease. An indirect fluorescent antibody test has been developed for Tyzzer's disease; however, it is not widely available. Although there have been several reports of cultivation of *Bacillus piliformis* on artificial media, the results have not been duplicated by other investigators. Attempts to grow the bacillus in tissue culture also have been unsuccessful. The organism can be cultivated in the yolk sac of 5- to 10-day-old embryonated hen's eggs. However, since antibiotics cannot be used in attempts to isolate the bacillus from tissues, bacterial contaminants are a major barrier to the use of eggs as a routine diagnostic tool.

Treatment of Tyzzer's disease in foals has been unrewarding. This is because the time between onset of clinical symptoms (if observed) and death is short. Furthermore, because the organism is an obligate intracellular parasite, it is little affected by antibiotics. Few suitable means exist for prevention and control of the disease in horses. If feasible, a 0.3% chlorine bleach solution, which has been found effective in spore inactivation, can be used to disinfect a contaminated facility. Since it is possible that mares may serve as carriers of the organism, and since the spores apparently survive for long periods of time in the environment, newborn foals should be kept isolated from mares having lost a foal to Tyzzer's disease and from suspect pastures.

#### Additional reading

1. Ganaway, J. R., Allen, A. A., Moore, T. D. "Tyzzer's Disease" *American Journal of Pathology* Vol. 64, No. 3:717-730, 1971.
2. Swerczek, T. W., "Multifocal Hepatic Necrosis and Hepatitis in Foals Caused by *Bacillus piliformis* (Tyzzer's Disease)" *Veterinary Annual* 17:130-132, 1977.

# Tetralogy of Fallot

## *A deadly quartet of heart defects*

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Dudley L. McCaw, D.V.M.  
Department of Veterinary Medicine & Surgery

### Fifth in a series

Four congenital defects comprise tetralogy of Fallot: pulmonic stenosis, ventricular septal defect, overriding aorta, and right ventricular hypertrophy. This combination of defects leads to delivery of unoxygenated blood to the peripheral circulation, causing cyanosis. The overriding aorta usually is positioned to receive blood from both the left ventricle (oxygenated blood) and the right ventricle (unoxygenated blood). The pulmonic stenosis increases the pressure of the right outflow tract, thus helping to shunt blood out the aorta. Right ventricular hypertrophy is really a secondary problem due to the pulmonic stenosis.

Puppies with tetralogy of Fallot generally have stunted growth and are smaller than their littermates. Dyspnea, fatigue and possibly syncope are usual presenting problems. Cyanosis may be present at rest or precipitated by slight exercise. Polycythemia is present caused by unoxygenated blood being delivered to the kidneys.

Auscultation of the chest may not reveal a murmur. This is the case if pressures on the right and left side of the heart are about equal and no turbulence is being produced. Murmurs, if present, vary in location and intensity. Whereas some are those of pulmonic stenosis (i.e. an ejection crescendo-decrescendo murmur heard best on the left side), other murmurs are holosystolic heard best at the right cranial thorax.

The electrocardiogram usually reveals right ventricular enlargement.

### Radiography

Radiographically, dogs with tetralogy of Fallot usually demonstrate right-sided

heart enlargement on both lateral and ventral dorsal radiographs. The left side of the heart appears normal. Even though pulmonic stenosis is part of this syndrome, no evidence of a pulmonary artery bulge is seen on the ventral dorsal radiograph because the main pulmonary artery is hypoplastic. The lung field is hypovascular as blood is shunted away from the pulmonary vasculature to the systemic circulation.

Figure 1 is the lateral radiograph of a young dog with tetralogy of Fallot. The heart does not appear to be significantly enlarged, although some right-sided heart enlargement is evident. The pulmonary vasculature to the cranial lung lobes is markedly reduced in size. Figure 2 is the ventral dorsal radiograph of the same dog as in Figure 1. The apex of the heart is shifted over into the left hemithorax by the enlarged right ventricle. The pulmonary vessels to the caudal lung lobes are smaller than normal and no evidence of a pulmonary artery bulge is seen.

Non-selective angiography is an ideal technique to diagnose tetralogy of Fallot. Figure 3 is the first film of the angiogram taken immediately after the injection of the contrast media. It demonstrates contrast media within an enlarged right ventricle and a markedly thickened right ventricular wall. The contrast media simultaneously fills the pulmonary artery and the aorta without filling the left atrium and left ventricle. This vascular filling anomaly is pathognomonic for cardiac diseases in which blood is shunted from right to left such as tetralogy of Fallot.

### Prognosis

The prognosis is poor in cases of tetralogy of Fallot. Surgical widening of the stenotic pulmonary lesion can benefit some animals and should be the first therapy considered. Propranolol has been shown to be of some benefit and might be tried if surgery is not possible.

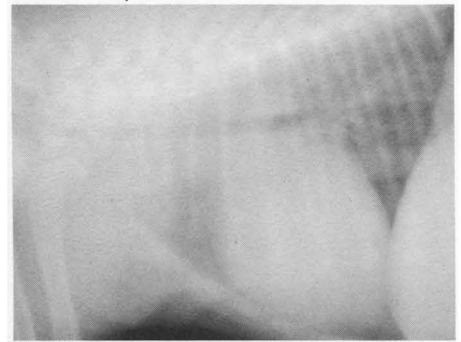


Figure 1: Lateral thoracic radiograph of a dog with tetralogy of Fallot. Note the slight elevation of the carina, increased sternal contact of the heart, and increased width of the heart.

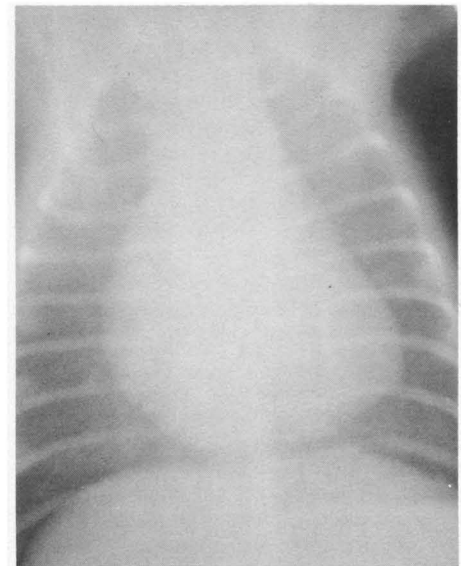


Figure 2: Dorsal ventral thoracic radiograph of a dog with tetralogy of Fallot. Note the displacement of apex of the heart into the left hemithorax by an enlarged right ventricle. No evidence of a pulmonary artery bulge is seen.

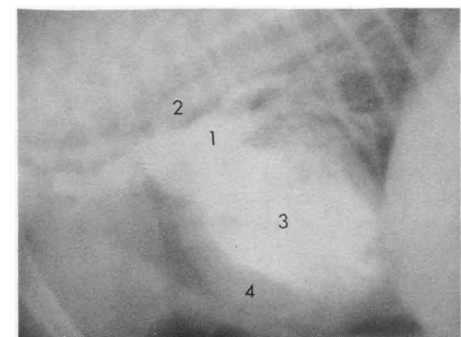


Figure 3: Non-selective angiogram of a dog with tetralogy of Fallot. Note the contrast media simultaneously filling the pulmonary artery (1) and aorta (2). The right ventricle is enlarged (3), and the right ventricular wall is thickened (4).

# 58th Annual Conference

October 10-11, 1982

Nearly 250 veterinarians gathered in Columbia October 10 and 11 for the 58th Annual Conference for Missouri Veterinarians. The First Annual Midwest Conference for Animal Health Technicians was held concurrently.

Conference participants heard presenta-

tions on small animal urinalysis, urinary tract infections, wound healing and bandaging, elbow lameness, immune-mediated diseases, equine orthopedics, food animal orthopedics, *Haemophilus pleuropneumoniae* in pigs, swine parasitism, coccidiosis in nursing piglets, and pig sex education and

herd production monitoring.

Table topics covered the gamut of small and large animal treatment problems, and "lunch with the faculty" offered veterinarians another chance to discuss popular topics with College faculty members.



Dean Willard Eyestone (right) presents an Award of Recognition certificate to Dr. Harry H. Berrier, associate professor emeritus of veterinary pathology, and his wife, Lina, during the Annual Conference.



Veterinarians milled about the Ramada Inn, socializing with new and old friends, during the Annual Conference banquet.

Don Connor photos

## Dr. Burgess honored at alumni luncheon

Dr. Ernest E. Burgess received the Alumni Citation of Merit and Lee Rolf Memorial Statuette from the College of Veterinary Medicine during the alumni luncheon of the Annual Conference.

Dr. Burgess, a 1952 graduate of the College, operates Burgess Veterinary Hospital, a small animal practice in Jefferson City. Earlier this year, he was named Missouri Veterinarian of the Year by the Missouri Veterinary Medical Association. He has served as MVMA president and vice president, and was one of the founders of the veterinary museum in Jefferson

City.

Dr. Burgess also is a past executive board member of the Heart of America Humane Society, and a member of the College Columns Club and the Governor's Advisory Council on Agriculture. He is active in several community service clubs and church activities.

## College wins contract from Sterling-Winthrop

Dr. Terry Blanchard, assistant professor of veterinary medicine and surgery, has received a \$12,530 contract from Sterling-Winthrop Research Institute to conduct hormonal assays on equine blood samples. Other theriogenologists working on the project with Dr. Blanchard are Drs. C.J. Bierschwal, Ron Elmore and Robert Youngquist, and endocrinologist Dr. V.K. Ganjam.

The work will be coordinated with that of Dr. Marolo Garcia of the University of Pennsylvania's New Bolton Center.

## Emergency vets organize

The American Association of Veterinary Emergency Clinicians will convene during the Western States Veterinary Conference in Las Vegas, Nevada, February 21-24, 1983.

For more information, contact Dr. Jerry McGraw, 1450 Brookside Drive, Hoffman Estates, Illinois, 60194, or call (312) 577-9044 (evenings) and (312) 885-4971 (days).

## Datebook

**January 7-8.** Continuing education workshop for small animal hospital technicians, at the College.

**January 13.** Continuing education workshop on skin tumors, at the College.

**January 14.** Continuing education workshop on equine respiratory problems, at the College.

**January 15.** Equine Health Day at the UMC Livestock Pavilion.

**January 20.** Visiting lecturer: Dr. Bruce Wilkie of the University of Guelph will speak on "Respiratory Immune Response to Microbial Pathogens and Allergens" at 4 p.m. in the College's Teaching Hospital Auditorium.

**January 28-30.** 91st annual meeting of the Missouri Veterinary Medical Association at Lodge of the Four Seasons, Lake Ozark, Missouri.

**February 6.** Continuing education workshop on bovine reproduction, at the Col-

lege.

**February 11.** Continuing education workshop on advances in critical care, at the College.

**February 21-24.** Intermountain Veterinary Medical Association/Western States Veterinary Medical Association meeting, Hilton Hotel, Las Vegas, Nevada. The College will host an alumni reception.

**February 24.** Continuing education workshop on special radiographic procedures, at the College.

**February 26.** Veterinary Medicine Career Day, at Columbia's Ramada Inn.

**July 18-21.** American Veterinary Medical Association convention, New York City. The College will host an alumni reception.

**October 15.** Fourth Annual Veterinary Medicine Alumni Day at the College. Special activities will include the Missouri-Nebraska football game.

# Missouri Veterinarian

## A walk on the wild side

Life as a zoo veterinarian is truly for general practitioners.

Lorin Lawrence, VMIV

A winter externship at the Oklahoma City Zoo opened my eyes to zoo animal medicine, providing a cache of memorable cases and a better understanding of the role and responsibility of the zoo veterinarian.

The Oklahoma City Zoo is one of the country's major zoological parks, boasting 1,753 animals that represent 467 species of mammals, birds, fish and invertebrates. The fulltime staff of more than 100 work at the 100-acre site. The hospital is a separate building staffed by fulltime veterinarian, Dr. Ed Ramsay, and a secretary/technician. His facilities include a laboratory, surgery, treatment/radiograph room, indoor/outdoor cages, a small mammal cage area, pharmacy, office and Porta-vet bed truck.

One of the first cases we tackled shortly after my arrival in January was the broken beak of a Maguri stork. The beak is extremely long (13 inches) and very narrow. The upper beak was detached at its midpoint. Cyanoacrylate (Technovit®) had not done the job. Precise alignment was necessary for the bird to eat and make appropriate clatter for mating season, a critical time for this rare creature.

The "nose job" was successful, using an intramedullary pin driven into the sinuses of the proximal fragment and the loose fragment (stuffed with Cyanoacrylate) on the protruding part of the pin. After some grinding, the beak worked like new. Mating behavior was observed several weeks later.

All through the winter, infant hoofed stock (addox, waterback, eland, sitatunga, Grant's gazelle) developed neonatal diarrheas. Research revealed the usual 6-foot-long list of etiologies: reovirus, coronavirus, enterovirus, *E. coli*, Klebsiella, etc. Antibiotics, fluids, vitamins, minerals, lactobacillus treatments, nursing care and occasional steroids usually solved the problems. Losses were significant, however, as many of these antelope are worth thousands of dollars as adults. Nothing



Author Lorin Lawrence examines a snow leopard at the Oklahoma City Zoo.

warms the heart more than the sight of a spindly little gazelle gulping down formula after coming back from complete prostration.

Kangaroos are a familiar part of every zoo. These gentle creatures thrive in zoo captivity. They are not very intelligent, but neither are they timid. Kangaroos are controlled easily by grasping the massive tail and steering them in the right direction.

Tragedy struck the Oklahoma City Zoo's Western gray 'roo herd last winter. The animals were gathered in a small holding cage with a 4-foot ceiling. Just outside, unbeknownst to the staff, physical plant workers were using jackhammers. The racket caused the 'roos to literally "bounce off the walls." When they were released, one young female was found on the ground, paralyzed. Radiographs revealed no lesions. A call to the local hospital brought in a couple of M.D. radiologists fascinated with the problem. Under Ketamine/rompun, a myelogram was attempted, bringing a suspected diagnosis of a fractured dens. The kangaroo did not survive anesthesia. Necropsy confirmed

the diagnosis: the cord had been severed almost in half. Despite the loss, the zoo gained in one way: it opened doors for further consultations with outside experts.

The Herpetarium usually presented routine cases: bacterial stomatitis in the green tree python, respiratory disease in gray kingsnakes, bite wounds in collared lizards. One day, however, the routine deviated. An Amazon river turtle was floating cock-eyed with his port side underwater and the starboard side in the air! Radiographs showed gas-filled bowel loops. After two weeks of Biosol-M, he was floating right with the world once again.

One of the Oklahoma City Zoo's prize possessions, Josephine the mountain gorilla, suffered a month's duration of diarrhea, completely refractory to therapy. Difficult to distinguish from their lowland cousins, mountain gorilla's are on the brink of extinction; there are less than 200 left in the world. Oral antibiotics were ineffective, but cherry-flavored barium seemed to help temporarily. Repeated fecals were negative until an M.D. pathologist identified some trophozoites as *Balantidium coli*. Josephine was treated with Flagyl® and her stools improved rapidly. Her feces became so well-formed, she had no difficulty winging them at her doctors.

The very diversity of zoo animal medicine prevents zoo veterinarians from specializing; they are generalists in the broadest sense. They must take what is known about the relatively few domestic animal species and apply that to all other forms of wildlife. A thorough knowledge of phylogeny is necessary. Zoo veterinarians must approach the well-being of the collection from a preventive medicine/herd health perspective. Neonatal diarrhea outbreaks could be prevented to a great degree by timing breeding for spring and fall births, rather than winter. Reptile respiratory diseases could be headed off by renovating the ventila-

*Continued on Page 8*

## Dean's Corner



Dear Colleagues:

The students, faculty, and staff of the University of Missouri College of Veterinary Medicine wish you and your family a happy holiday season and a prosperous New Year.

As we all approach the uncertainties of the coming year, we need to pause and reflect on the past achievements of our profession. We need to rededicate ourselves to serving mankind and the animal kingdom. The College will strive to provide better services, resources and educational opportunities for you in

the coming year.

The College is well aware that it can continue to grow, and indeed survive, only through generous and loyal support from its alumni and friends. We appreciate your dedication, and thank you for your help and assistance.

With best personal regards, we hope you and yours a very successful New Year.

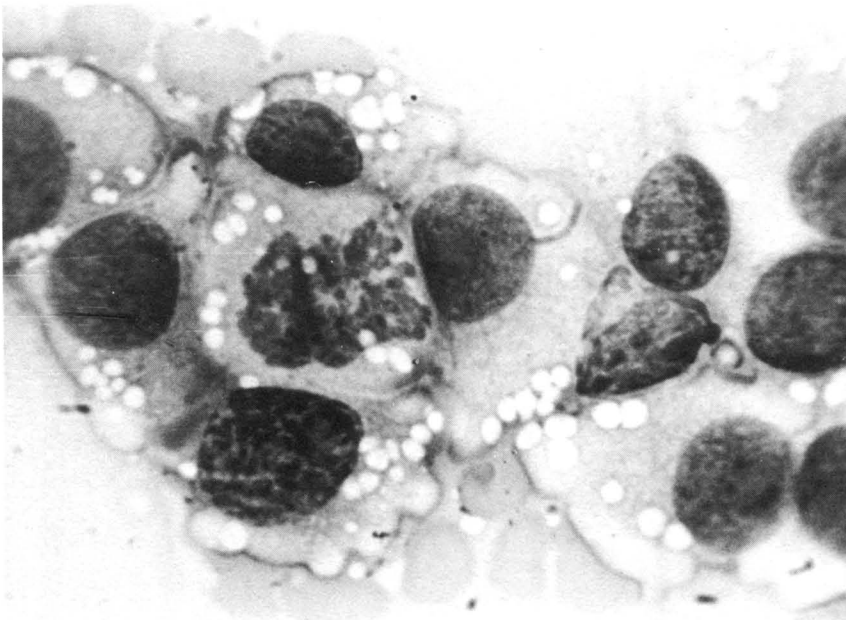
Cordially yours,

Kenneth H. Niemeyer, D.V.M.  
Assistant Dean for Student  
and Alumni Affairs

## In memorium

Dr. Dwight Creach, a member of the Class of 1965, died recently. He had practiced in Pocahontas, Arkansas.

Friends may make contributions to the Veterinary Medicine Memorial Fund through Dr. K.H. Niemeyer, College of Veterinary Medicine, University of Missouri, Columbia MO 65211.



## What's your diagnosis?

A 3-year-old female, cross-bred dog was presented to the Veterinary Teaching Hospital with a history of intermittent bleeding from the vagina for the past several weeks. Physical examination revealed the presence of a bleeding mass protruding from the vagina.

A fine needle aspirate of this mass was made and smears prepared from the aspirated material. The photomicrograph shows a typical field as seen on a Wright's stained smear of this aspirate.

Answer on Page 8

## Alumni notes

Dr. Tommy T. Lee, Nashville veterinarian, was recently honored at the annual meeting of the Tennessee Veterinary Medical Association. Dr. Lee, a member of the Class of 1957, was presented the Veterinary Award, given to an outstanding Tennessee veterinarian who has done the most for organized veterinary associations.



Dr. Lee is author of a weekly pet column in the *Madison Messenger* and in the past year has been instrumental in forming an organization to promote the use of animals in the therapy of the handicapped, the mentally and emotionally deficient, and the aged.

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Well-known Savannah veterinarian, Dr. H. Leon Boyd, has been elected president of the Tennessee Veterinary Medical Association at the annual meeting of TVMA in Gatlinburg. Dr. Boyd, a member of the Class of 1961, is owner of Boyd Animal Clinic in Savannah.



A native of Ripley, Dr. Boyd received his B.S. and D.V.M. degrees from the University of Missouri.

\*\*\*

Alaska Animal Eye Clinic, 8050 Old Seward Highway, Anchorage, Alaska, was accepted as a member hospital by the American Animal Hospital Association (AAHA).

Dr. Joyce M. Murphy is the director of the Clinic, which was established in 1979. Dr. Murphy is a member of the Class of 1970.

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Laguna Niguel Animal Clinic, 30001 Crown Valley Parkway, Laguna Niguel, California, has been accepted as a member hospital by the American Animal Hospital Association (AAHA).

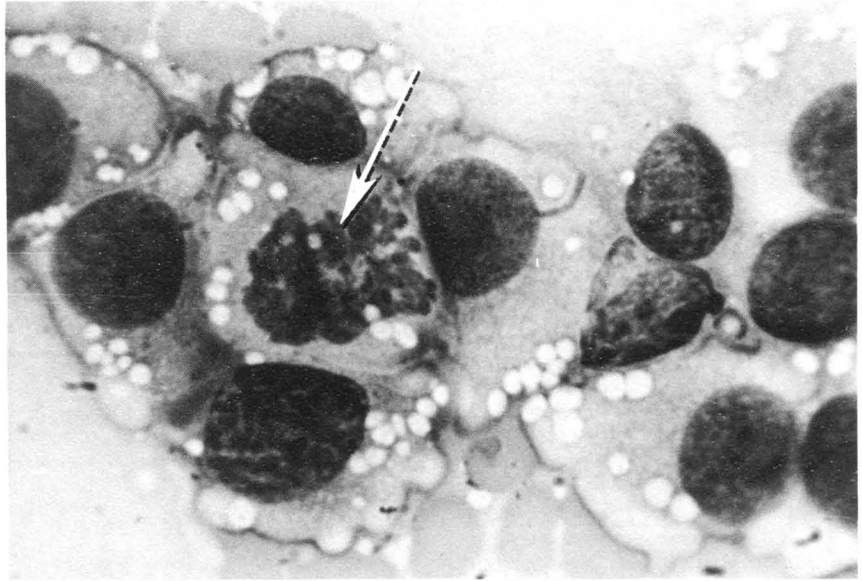
Dr. John G. Warren, a member of the Class of 1963, is the director of the hospital, which was established in 1969.

## Diagnosis

From Page 7

Transmissible Venereal Tumor (TVT) Photograph has round or epithelial-like cells with round to oval nuclei and fine granular chromatin. They have moderate to abundant pale cytoplasm with distinct round vacuoles. One cell contains a nucleus in mitosis (arrow). On Wright-stained preparations, the cytoplasm will be pale blue to blue-gray and finely granular. With Diff-Quik and New Methylene Blue stain, a prominent round nucleolus will be present. The cytoplasmic vacuoles contain lipid (Sudan IV positive). TVT is one of the discrete or round-cell neoplasms.

Donald A. Schmidt, D.V.M., Ph.D.  
Steven L. Stockham, D.V.M., M.S.  
Department of Veterinary Pathology



## Zoo

From Page 6

tion system in the Herpetarium. Hence, approaching collective specimen health on a case-by-case basis is inappropriate in zoos.

Many critical problems facing zoo veterinarians are clearly herd health-oriented. The Oklahoma City Zoo has one of the most diverse hoofed-stock collections in the country. Unfortunately, many individual animals within herds are not identified. Males and females are grouped together all year. The arrangement results in considerable inbreeding, which can severely compromise the future of animals with limited gene pools. Another major problem among the stock is malignant catarrhal fever (MCF), which is transmissible to cattle. White-tailed gnu (black wildebeest) are inapparent carriers of MCF, and the disease has been demonstrated in the zoo's gnu herd, a

finding which distresses American cattle producers.

The zoo veterinarian's responsibilities do not stop with his wild charges. Often he is the key link in the zoo's public relations program, giving talks to citizen groups and submitting to media interviews. As the zoo's link to the scientific community, he plays a central role in research conducted by outside investigators and zoo staff. He may go to annual conferences and present papers and enlist expertise from specialists in the community. In Oklahoma City, for example, the assistant chief medical examiner was a great help in postmortem exams.

Individuals pursuing a career in zoo animal medicine should be extremely hard working and ambitious; competition for the six existing internships and residencies is keen. Worse, only one or two vacancies at zoos crop up each year across the country. These factors must be weighed when contemplating a career as a zoo veterinarian.

## 10 seniors named to Who's Who

Ten students at the College of Veterinary Medicine have been named to the 1983 edition of *Who's Who Among Students in American Universities and Colleges*, a national register of outstanding campus leaders.

The students, all members of the Class of 1983, are: Beverly Jane Bierschwal, Stanley John Bladdek, John Robert Bloszies, David Edward Graeff, Kevin George Keegan, Mary Elizabeth Meyer, Wayne Ray Morris, Bruce Alan Robertson, Stephen Jack Short, and Mark Thomas Van Horn.

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## Veterinary Medical Review

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