



# Animal Health Centre NEWSLETTER



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## CONTENTS

Pathologist Position .....	2
Retirement of Dr. Robert Clugston .....	3
New IBR & BVD ELISA Serology Test ....	3
Avian News	
Disease Alert: Fowl Pox .....	4
Avian Pox in Blue Grouse .....	4
Extracts from 'Review of Diagnostic Pathology Submissions .....	5
Calling all large animal practitioners .....	7
Necropsy Room Cases of Interest	
Blackleg in cattle .....	9
ITEME brain infection in a Jersey heifer	10
Malignant Catarrhal Fever in Pere David Deer .....	10
Osteoporosis in feeder calves .....	11
Strangulated bowel in a mare .....	12
Erysipelas in pigs .....	12
Coccidiosis in piglets .....	13
Respiratory distress in dairy goats .....	13
Vitamin D toxicity in sheep, puppies	14
Fatal necrotizing myositis in a puppy	15
Horses and buttercups .....	16
What are endotoxins? .....	17
Gut flora dysbiosis and animal disease	17
Use of rabbits in ostrich rearing .....	18
Canine aggression and human personality traits .....	18
Anecdote of a Roman medical school .....	19
Frederick Banting & insulin .....	19
On Pathology .....	20
Richard Wagner the composer .....	20

## From The Chief Veterinarian

R. J. Lewis

In recent issues of this Newsletter, there have been occasional references to zoonoses (diseases transmissible from animals to man) identified at the Animal Health Centre. A November 1997 issue of *US News & World Report* featured a cover story entitled "Outbreak" highlighting this concern. The story centred on the devastation wreaked on several farm families resulting



from an infection acquired from their dairy cattle. The strain of organism responsible for deaths in their animals, *Salmonella typhimurium* DT104, also caused severe illness in the families that had been drinking unpasteurized milk. Although the story was centred in New York state, it also mentioned that cases had been identified in Washington state. Subsequent reports indicate the agent has been identified in several species of animals and people from several countries; 148 cases were confirmed in people in Canada in 1996. The Animal Health Laboratory in Ontario has identified this organism in submissions from 17 cattle herds, 10 swine herds, and one poultry flock over the past 18 months (*Cepto*, Ontario MAFRA, December 1997).

All five isolates of *S. typhimurium* identified by the AHC, originating from BC cattle, were further categorized by the Centre for Disease Control (CDC) in Vancouver as this strain, DT104. We are unaware, however, of any human illness associated with these animals. The outstanding feature of this organism is resistance to conventional antibiotic treatments.

Further from home, the recent cross-species spread of a strain of avian influenza virus (H5 N1) from poultry to people in Hong Kong provides another reason to seek rapid diagnosis and be aware of the potential for various pathogens to cross species boundaries.

Consult with your veterinarian if experiencing health problems in your herd and alert your physician of any human illness. Assume that any illness in animals has at least the potential of being transmitted to

**TOLL FREE NUMBER AND WEB SITE:** Please note that the Animal Health Centre has a toll free number: 1-800-661-9903. Keep this in mind if calling the Lab long distance. This Newsletter, and other information from the AHC, may also be found on the Internet at our web site: <http://www/agf.gov.bc.ca>.

## From the Assistant Chief Veterinarian continued...

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humans and take appropriate precautions to reduce spread to healthy animals, yourself or family members.

I was privileged to attend the annual meeting of the American College of Veterinary Pathologists (ACVP) this year and, as always, gained a lot of new scientific information. One major session of particular interest, Environmental Toxicology, centred on the use of animals as sentinels of environmental health. The well-known example, the canary in the mine, is probably the first recorded use of an animal as an indicator species. Another example is the variety of cancers in wild fish associated with chemical contamination of waterways. There was a presentation on the use of mollusks to detect high levels of PCB contamination on the US East coast and another study detected an increased prevalence of breast cancer in overweight dogs exposed to flea dips. Work is presently underway to establish a tumour registry for companion animals to determine if there may be an increased prevalence of various tumour types that could be associated with specific environmental factors.

Since animals share our environment and have a reduced lifespan in comparison with humans, they may also serve us by acting as indicators for environmental risks to which we are exposed; by identifying these risks, we can take action to reduce exposure. We can expect to hear more on the use of animals as sentinels for human health.

Extensive work has confirmed that dietary restriction in laboratory animals is the best single manipulation to increase longevity. Laboratory rats fed ad lib develop a wide variety of tumours as well as degenerative alterations in blood vessels. Similar animals fed at 75% or less of the same diet lived significantly longer and stayed young longer. Whether this applies to humans or not is yet to be definitively proven but it would appear likely. I am not sure I really wanted to hear these results but, perhaps now that we are in the New Year....?

On behalf of the Animal Health Centre staff,  
Best wishes for a happy and successful 1998!

## Pathologist Position

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*R. Lewis*

**Dr. Stephen A. Raverty** has been hired on an auxiliary basis to replace Dr. Clugston until a permanent replacement is hired. Stephen earned his DVM from the WCVM, after receiving an MSc from the same institution. He also obtained a PhD from the University of Stirling in Scotland. He spent one year performing diagnostic pathology on channel catfish at Mississippi State University; completed a residency in zoo animal pathology at the University of Illinois; and a residency in pathology of small animals and exotic species at the Animal Medical Centre in New York. Stephen is presently continuing his studies toward his specialty board examinations (American College of Veterinary Pathology) in anatomic pathology. Please join with us in welcoming Dr. Raverty to the Animal Health Centre.

## Retirement of Dr. Robert Clugston

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After almost twenty years of service to the B. C. Ministry of Agriculture, Fisheries, & Food, Dr. Clugston has retired from the Animal Health Centre, effective January 08, 1998.

Bob began with the B. C. Veterinary Laboratory in June of 1978 following several years experience in provincial diagnostic laboratories in Alberta and Ontario, as well as a brief stint with the Canadian International Development Agency in Uganda. He received his DVM from the Ontario Veterinary College and a PhD in veterinary pathology from the Western College of Veterinary Medicine. He has been the senior veterinary pathologist at the Animal Health Centre for many years and his expertise in veterinary pathology will be greatly missed by his colleagues as well as the many clients with whom he has dealt over the years. His enthusiasm and willingness to always go the extra mile to determine the diagnosis or assist

with a problem is well known but we will also miss his good cheer and self-deprecating sense of humour.

Bob has many interests outside his professional career and, undoubtedly, bridge, cross-country skiing, sailing, and handyman activities will consume a great portion of his time. We wish he and Carole best wishes for a long and happy retirement!

## New IBR & BVD ELISA Serology Test

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The Animal Health Monitoring Laboratory now has available an indirect 96 - well plate assay for the detection of antibodies in bovine sera to herpesvirus 1 (IBR) and BVD. These tests were developed at the AHML/AHC and were patterned after the ELISA development method used at WCVL. The ELISA test is more sensitive and has a quicker turn-around time than the virus neutralization test (VN) done in tissue culture. Large scale comparisons of sera tested by both the ELISA and VN have allowed the positive values obtained from ELISA to be quantitated into High, Moderate, Low, Suspect, and Negative groups. The test is best used in IBR and BVD monitoring and eradication programs similar to the ones now being used in Europe. The fee will be **\$3.50** per test. It is requested that practitioners requesting ELISA submit a minimum of 20 sera. More information can be obtained by contacting, Ms. Letitia Curley at the AHML, ph. 604-556-3134; or Dr. John Robinson, AHC, ph. 604-556-3003.

## Disease Alert: Fowl Pox

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*V.A. Bowes*

Early last spring, poxvirus infection was diagnosed in wild songbirds, including house finches. Near the end of the summer, three separate backyard chicken flocks from the Mission area were diagnosed with the cutaneous (skin) form of pox. In December 1997, poxvirus infection was diagnosed in a commercial laying flock and a commercial turkey flock.

The source of infection is uncertain, but most likely has come from the wild bird population. In both commercial flocks, the infection had an unusual presentation. Skin and mouth lesions were absent but the proliferative pox lesions were present in the tracheas and lungs. Initially, the laying hens presented with respiratory signs suggestive of ILT (infectious laryngotracheitis). The turkeys presented with respiratory signs associated with severe pneumonia. These are the first cases of pox diagnosed in commercial birds in B.C.

Poxvirus is a slow-spreading virus infection that usually affects the skin of the head, feet, and vent, causing red to black scabs ("dry pox"). Pox can also cause raised lesions in the mouth and respiratory tract ("wet pox"), which may interfere with breathing and cause death by suffocation.

The virus is hardy and can survive in shed skin cells and scabs in the environment for months. Infection can be transmitted by mosquitoes and cannibalism. Recovered birds generally have strong immunity to re-infection.

There is no treatment for poxvirus infection. A commercial wing-web vaccine is available through local poultry veterinarians.

Poultry producers are encouraged to submit birds with suspicious skin or respiratory disease to the Animal Health Centre for laboratory examination and diagnosis.

## Avian Pox in Blue Grouse

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*R.E. Clugston*

**Avian pox** was diagnosed in a 4 month-old and a 3 year-old Blue Grouse. Within the 200 bird aviary, the owner reported that the adult bird, like others in the aviary, had suffered from swollen hocks and claw infections during the previous 2 weeks, when the condition first appeared. The affected birds were part of a closed flock, housed on wire floors.

Gross necropsy of the 2 submitted birds revealed severe, proliferative skin lesions involving the feet and hocks. One of the specimens also had severe exudative oral lesions involving the tongue and palate. Histological examination of affected skin sections revealed large numbers of poxvirus inclusion bodies associated with a hyperplastic dermatitis, and similar microscopic changes were noted within the oral cavity. Direct electron microscopic examination of affected tissues was positive for avian poxvirus. *Staphylococcus aureus* was also cultured from infected skin lesions, likely representing secondary skin infection by this opportunistic bacterial organism subsequent to the primary viral disease.

## AVIAN NEWS continued...

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It appears that all bird species are susceptible to avian poxviruses. Poxvirus infection has been reported in approximately 60 species of wild birds, as well as in caged birds, turkeys, and domestic chickens. The infection can occur in susceptible birds of any age. Poxvirus infection occurs through mechanical transmission of the virus through injured or lacerated skin. Insects may carry the virus mechanically, and deposit it in the eye, and mosquitoes have been shown to mechanically transmit the virus between birds.

Unfortunately, there is no specific treatment for birds affected with avian poxvirus. When a problem exists, consult an avian practitioner. From a preventive point of view, husbandry practises are recommended to alleviate environmental stresses that may lead to outbreaks. Please also see comments by Dr. Bowes in the previous article, regarding fowl pox in turkeys and its prevention in this species by vaccination.

From a clinical point of view, diagnostic differentials for this type of proliferative skin and foot lesions in a variety of birds are the crusty lesions of leg mites (*Cnemidocoptes pilae*), foot abscesses due to *Staph. aureus*, or subcutaneous urate deposits of gout.

## Extracts from the 'Review of Diagnostic Pathology Submissions': Animal Health Centre, from Jan 2 to November 24, 1997

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R.J. Lewis

	Dairy	Bovine
Idiopathic	39 (41%)	22 (54%)
Protozoal	27	(28%) <sup>1</sup>
Bacterial	10	9
Viral	1	3
Mycotic	1	2
Placentitis	1	74
<b>TOTAL:</b>	<b>95</b>	<b>41</b>

**Comment:** More whole fetuses are submitted from dairy cattle, which allows for a more complete evaluation; thus more specific diagnoses, including *Neospora sp* infection, are made.

### Sheep:

Chlamydial abortion was diagnosed in 2 sheep flocks. Three cases of copper poisoning and 3 cases of copper deficiency demonstrate the difficulty that producers appear to have in balancing this mineral. Other nutritional problems included emaciation (6), goitre (4), nutritional myopathy (2), and vitamin D toxicity. Polioencephalomalacia occurred in 3 submissions. Other diagnoses included enterotoxemia (2), gastrointestinal parasitism (2), caseous lymphadenitis (1), and pneumonia (1).

## Extracts from the 'Review of Diagnostic Pathology Submissions': Animal Health Centre, from Jan 2 to November 24, 1997 Continued...

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### **Goats:**

One case of chlamydial abortion and one case of *Coxiella burnetii* rickettsial abortion were diagnosed in goats. The latter is an unusual diagnosis in British Columbia and public health authorities were alerted. There were also 10 cases of copper deficiency and 7 cases of emaciation in goats. Pediculosis (3) and coccidiosis (5) also occurred. Of the ruminant species, Johne's disease is most commonly diagnosed in goats (5). Other diagnoses included contagious ecthyma (2) and arthritis due to caprine arthritis-encephalitis infection (2).

### **Alpacas and Llamas:**

An increased interest in these animal species accounted for several submissions this year. Emaciation was diagnosed on 6 occasions in alpacas and 3 times in llamas suggesting possibly a poor understanding of nutritional requirements. Similarly, there was one case of copper toxicosis in an alpaca and one case of vitamin D intoxication in a llama. Coccidiosis was diagnosed in 4 alpaca submissions; congenital anomalies (3) also appeared in this species. There were 2 cases of lymphosarcoma in alpacas. A congenital anomaly (choanal atresia) also occurred in a llama submission. Gastric ulcers were diagnosed on 2 occasions in llamas.

### **Wildlife and Game farmed Animals:**

Erysipelas was diagnosed in a free-ranging subadult killer whale. A captive killer whale died of septicemia due to overwhelming *Pseudomonas aeruginosa* infection. Parasitic pneumonia (6) and lymphadenitis(3) seem to occur frequently in free-ranging harbour porpoises.

Two cases of malignant catarrhal fever were diagnosed in non-domestic deer (also confirmed by PCR). Trauma (4) was diagnosed as the cause of death in fallow deer and there was also one case of Listeriosis in this species. Two abortions due to mycotic agents occurred in reindeer.

### **Companion Animals:**

There were 5 cases of viral enteritis diagnosed in dogs, 1 case of distemper, and 1 case of Tyzzer's disease. Glomerulonephritis was diagnosed in 7 dogs and there were also 3 gastric torsions and 3 cases of hemangiosarcoma in this species.

### **Horses:**

Actinobacillosis was diagnosed in 3 submissions, abortion due to bacteria in 3 cases, and viral abortion (EHV) in 1 case. There were 12 cases of idiopathic abortion in equine submissions. Intestinal accidents (4) and torsions (2) remain a problem in horses. There was also one case of Salmonellosis, 4 animals died due to septicemia, and there were also 5 submissions diagnosed as pneumonia.

## Extracts from the 'Review of Diagnostic Pathology Submissions': Animal Health Centre, from Jan 2 to November 24, 1997 Continued...

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### **Avian Submissions (in part):**

#### **Turkeys:**

Ionophore intoxication was specifically diagnosed in breeders(1) and meat turkeys (3) and was related in each case to feed mixing errors. Non-pathogenic avian influenza associated with bacterial infections accounted for 3 submissions. Crop infection, primarily due to *Candida sp* occurred (18) in poorly managed flocks. Colibacillosis was the diagnosis in 12 submissions. There were also 7 cases of coccidiosis and 3 of blackhead. Rickets was diagnosed in 7 submissions.

#### **Broiler chickens:**

Pullorum disease was diagnosed on one premise on southern Vancouver Island in November. Canadian Food Inspection Veterinarians quarantined and slaughtered all birds on the premise. Colibacillosis (39) is a prominent disease problem in broilers. There were 15 diagnoses of coccidiosis and 13 diagnoses of ascites in these birds. Liver problems (necrosis, hepatitis, and inclusion body hepatitis) accounted for 18 diagnoses; several of these were submissions from packing plants and the specific nature of the agent was not determined. Rickets (15) and long bone deformities (8) were also prominent.

#### **Pigeons:**

Zoonotic disease included chlamydiosis (4) and Salmonellosis (4). There were also 3 cases of trichomoniasis.

#### **Pet Birds:**

Poxvirus infection was a significant problem for canary breeders in 3 submissions and avian tuberculosis was also diagnosed in 1 canary submission. Proventricular dilation occurred in 2 psittacine submissions and Pacheco's parrot disease (2) was also diagnosed.

## Calling all large animal practitioners: a spring list

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By the time most large animal practitioners receive this newsletter, they will be deeply embroiled in the annual 'rite of spring' called the calving season. We wish them well, and offer the following small suggestions for laboratory submissions to the AHC to improve the value of information received:

1. Submission numbers in late winter and spring rise substantially, and many of these relate to neonatal calves, lambs, kids, foals. Please try to emphasize to your clients **the importance of retrieving placenta**, as well as the fetus, when sending in abortion specimens to your clinic. Remind them that a number of specific etiologic diagnoses are sometimes made primarily on the basis of placental tissue only (such as fungal abortion and *Coxiella sp.* abortion). Without placenta for

## Calling all large animal practitioners: a spring list continued...

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microscopic examination, culture, or other diagnostic tests, these diagnoses are often lost. Remember that **mouldy hay abortions may produce skin lesions on the aborted fetus**, that you can see grossly - over the neck, withers, or on the face, for example. In addition, placental cotyledons tend to be greatly enlarged, thickened and necrotic; **intercotyledonary areas are often leathery and opaque**, due to the presence of so-called "adventitial placentation".

2. Historically, B.C was the first province in Canada to identify and diagnose ***Neospora* protozoal abortion** in cattle; this condition continues to be a problem here, although primarily in dairy cattle. Generally, differences in management, feeding practices, and use of pastures, appear to be some of the factors involved in explaining the relative differences in the prevalence of this aborting agent between dairy and beef cattle. In either group, the vast majority of infections caused by *Neospora sp.* are spread vertically between mother and daughter, as opposed to horizontal spread of infection between animals. Abortions diagnosed with *Neospora* may abort again - best to cull them.

**Brain tissue** is very important in diagnosing this condition microscopically. The AHC also has an ELISA blood serum test which enables us to test the sera in aborting cows for antibodies to *Neospora sp.* **Immunoperoxidase studies** may also be carried out on aborted bovine fetal tissues for detection of the *Neospora sp.* organism. If removing the brain from the cranium is too difficult or too time consuming, send in the entire head together with the other fetal tissues, and we'll remove the brain here. If you do this, be sure the thyroids are either removed and packaged separately, or left on the neck stalk, so that we can remove them later, for histological examination. If you would like to receive a small information package on *Neospora sp.* protozoal abortion in cattle, phone the AHC and request one - we'll get it out to you as soon as possible.

3. When unravelling factors contributing to neonatal nonviability, weakness, diarrhea, etc., please remember to **sample thyroid tissue for histopathology**. In iodine-deficient calves, thyroids can be unremarkable as far as changes in size, so histopathology (and blood serum samples from the live animal, if possible, for serum iodine) are very important. In contrast, iodine-deficient kids and lambs may have greatly enlarged thyroids - so large, in fact, that they can cause difficulty at birth - a point to consider when an owner complains of lambing losses due to dystocias. Of course, these lambs are often stillborn or very weak, even if they are expelled normally. Compared to calves, normal thyroids in neonatal foals often appear rather prominent at birth; when in doubt, send in thyroid with other tissues for histopathology.
4. Don't forget **heart blood for immunoglobulins** - on necropsy, simply aspirate some heart blood from the incised ventricles, place in a red-topped vial, and send in for analysis. Owner complaints about unthrifty neonates, scouring calves, or unexpected deaths, can often be traced back to insufficient ingestion of colostrum in those few critical hours after birth. Measuring immunoglobulins from the heart blood provides you and your client with useful information.



## Calling all large animal practitioners: a spring list continued...

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5. Watch for **congenital anomalies** when examining specimens on necropsy. Cleft palate can be easily recognized; one of the most common of heart anomalies is an interventricular septal defect. Atresia ani (congenital absence or closure of the anus) or atresia coli may occur, the latter occasionally seen in Holstein calves, most commonly in males. Relatively speaking, umbilical hernias are fairly common in most species. Musculoskeletal lesions such as arthrogryposis may be seen in any species, and in the Charolais breed may be recognized in conjunction with cleft palate. In camelids, watch for cleft palate, heart defects, umbilical hernia, and choanal atresia (a membranous or bony blockage between nasal and pharyngeal areas), among others.

*"If man could be crossed with the cat, it would improve man but deteriorate the cat."*

– Mark Twain

## NECROPSY ROOM CASES OF INTEREST:

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### Blackleg in cattle

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**Blackleg** infection (necrotizing myositis) killed 12 calves and 6 pastured yearlings over a 4 day period. Diagnosis was confirmed on gross post mortem by the detection of typically dark, necrotic muscle areas and confirmed by the fluorescent antibody (FA) test for *Clostridium chauvoei*, the causative bacterial agent.

This case was unusual due to the large numbers of animal deaths in a short period of time. Factors that contributed to the outbreak were a questionable vaccination program, as well as severe copper and selenium deficiencies detected on trace mineral analysis of liver tissue. Both these essential trace elements have many metabolic functions, and influence the well-being of the animals' immune status. In addition, pasture lands on the farm had recently been flooded due to excessive rains; the offending organism, which may exist in the soil, may have been washed or borne upward from lower soil depths to the pasture surface, leading to contamination of forage grasses.

### ITEME (*Hemophilus somnus*) brain infection in a Jersey heifer

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*R.E. Clugston*

Acute, suppurative meningoencephalitis (inflammation of the brain) was diagnosed in an 8 month-old Jersey heifer calf from a Lower Mainland dairy. The animal was found dead in its stall without premonitory signs, with no evidence of a struggle. On necropsy, subcutaneous blood-stained fluid was seen on the head, the ventral neck area, and the brisket. A large volume of fibrinous fluid was noted within the foramen magnum of the skull, and grossly there was evidence of a severe fibrinous meningitis. Multiple hemorrhagic foci were seen within the brain tissue. Microscopically, brain tissue had multiple areas of vascular thrombosis, hemorrhage, and necrosis, with locally intense neutrophilic inflammatory infiltrates. Suppurative foci were also observed within the heart muscle, as well as in skeletal muscle of the head and neck.

Bacterial culture of the brain yielded a heavy growth of *Hemophilus somnus*, the pathogen associated with 'infectious thromboembolic meningoencephalitis' (I.T.E.M.E.) in cattle.

The animal had received two vaccinations with an *H. somnus* bacterin vaccine only a short time previously, at weaning. The inoculations had been given 2 weeks apart. This 100 - animal dairy herd has a history of *H. somnus* infection; an extensive vaccination program had been established following an outbreak the previous winter. Unfortunately, although vaccination with *H. somnus* vaccines may help reduce the incidence of this disease in cattle, the development of clinical signs in some animals may still occur. From an epidemiological standpoint, specific factors that may be predisposing animals in this dairy herd to an ongoing threat of ITEME have not yet been determined.

### Malignant Catarrhal Fever (MCF) in a Pere David Deer

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*R.E. Clugston*

Malignant catarrhal fever (MCF) was recently diagnosed in a mature Pere David Deer, a species which is particularly susceptible to this causative herpesviral agent. On gross post mortem, lungs appeared firm in texture, and rumen contents were scant. Intestinal contents were bloody. Microscopically, the most significant finding was a vasculitis or inflammation of blood vessels, at times with readily visible necrosis of vessel walls. This vascular change was observed in a variety of different organs, including the heart and meningeal vessels of the brain, and is a characteristic finding of this virus disease of cattle.

Polymerase chain reaction (PCR) studies at the AHC were positive for the sheep-associated herpesvirus of malignant catarrhal fever.

Recently, this disease was also diagnosed at the AHC in a Jersey cow, and in an 11 year-old female bison. Both of these animals, on separate farms, had previous exposure to sheep, indicating probable exposure to the sheep-associated herpesvirus. The disease in both animals was diagnosed on the basis of gross and microscopic examination of tissues, and confirmed by PCR.

MCF is an acute, highly fatal, infectious disease of cattle and farmed deer. The disease is characterized by catarrhal and mucopurulent inflammation of the eyes and nostrils, erosions in the oral mucous membranes, rapid emaciation, corneal opacity of the eyes, and nervous symptoms.

## NECROPSY ROOM CASES OF INTEREST: Continued...

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### Malignant Catarrhal Fever (MCF) in a Pere David Deer continued...

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The disease has a worldwide distribution. In Canada and the United States, sheep carry and are the source of the virus to cattle (although it does not affect them), while in Africa it is carried by wildebeest. The disease is not thought to be transmissible between infected cattle. The organism is exceedingly difficult to isolate or grow in tissue culture; fortunately, the development of a PCR test has greatly aided the detection of virus in suspected cases. The disease appears relatively uncommon in British Columbia, although in 1997 it was diagnosed at the AHC in the 3 different species named above.

### Osteoporosis in feeder calves

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*J. Coates*

**B**one specimens and visceral organs from several feedlot calves of approximately 5 to 6 months of age were received for examination. These included femoral, tibial, humeral, radial and ulnar bones, portions of lumbar spinal vertebrae, together with portions of lung, heart, and other abdominal viscera.

As described by the veterinary practitioner, the most notable observation on receipt of these tissues was multiple fractures of the submitted femoral (hip) bones. Both proximal and distal fractures occurred adjacent to the cartilaginous growth plates of the femurs in these young growing animals. Despite the obvious fracture sites, which were very hemorrhagic, remaining bone structures including the spinal vertebrae and skull bones were still relatively rigid or hard in texture, and resisted cutting with a knife. The actual thickness of the femoral shaft cortical bone, however, appeared less than usual for an animal of this age; thickness of the distal femoral shaft proximal to the growth plate varied from 1.0 to 1.5 mm.

A tentative diagnosis of osteoporosis was made in these animals, based on gross examination. This diagnosis was supported by microscopic examination of the femoral bones, where there was marked depletion, resorption, fragmentation and collapse of primary cancellous bone adjacent to the growth plates, together with local hemorrhage and early adjacent marrow fibrosis (scar tissue formation). Similar pathological changes were noted in vertebral sections.

Osteoporosis, or bone atrophy, refers to a deficiency in the amount of bone tissue in the skeleton, or part of the skeleton (N. Palmer, *Pathology of Domestic Animals*, vol 1;1993). This deficiency or loss of bone is pathologic or abnormal in nature, while the remaining bone is still chemically normal. The term also implies a reduction in bone mass. Osteoporosis is a lesion, not a specific disease, and results from an imbalance between bone formation and resorption, in favor of resorption. Various conditions may lead to resorption of bone with reduction in bone mass. One of the outcomes of such a process in an affected animal is a predisposition to fractures.

Osteoporosis is certainly an unusual, almost rare, diagnosis in young growing animals such as these calves, and implies a drastic or marked reduction in normal calcium levels within the ration. In the case described here, it was later learned that the farmer had inexplicably stopped adding calcium supplement to the grain diet (no roughage, nor hay) that these animals were receiving. Although vitamin D levels in liver tissues from these specimens were not determined, at least some vitamin D was likely present in the vitamin supplement still being provided. A condition of bone

## NECROPSY ROOM CASES OF INTEREST continued...

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### Osteoporosis in feeder calves continued...

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softening termed osteodystrophia fibrosa may also develop in similar calcium/phosphorous upsets, but usually develops where the calcium deficiency is relative to a phosphorous excess, rather than where there has been an abrupt withdrawal of all calcium, as in this case.

Following the diagnosis of osteoporosis, a nutritionist was immediately consulted. All necessary ration adjustments were then promptly carried out to provide the remaining animals with a balanced and nutritious diet, including the provision of adequate roughage.

### Strangulated bowel in a mare

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A mature mare was presented for necropsy after a short period of acute, progressively severe, colic. Gas distension of the intestine was palpable per rectum, and an intestinal accident was suspected. The animal progressively deteriorated despite treatment, and was finally euthanised for humane reasons.

Gross necropsy revealed severe strangulation and necrosis of approximately 8 feet of small intestine, which had passed through the **epiploic foramen**, a membranous opening between connecting peritoneal folds located on the posterior or visceral surface of the liver, dorsal to the so-called portal fissure. With increasing age, the right lobe of the liver atrophies; this may result in enlargement of the epiploic foramen, and thus predispose to herniation of bowel (Livesy et al, Can Vet Jour 1991, vol 32: 434 - 436).

Intestinal accidents in the horse are diagnosed quite commonly at the AHC, as reported elsewhere in this newsletter by Dr. Lewis, in his *Review of Diagnostic Pathology Submissions at the AHC*. The relatively long perambulations of the gastrointestinal tract in this herbivorous species predisposes it to a variety of misadventures, in contrast to the simpler and generally less accident-prone alimentary tube of carnivore species, such as the dog.

### Erysipelas in pigs

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**Erysipelas** was recently diagnosed in submitted fresh and formalin-fixed tissues from a 6 week-old pig, one of a group of 200 animals of the same age. The owner had observed cold extremities in affected animals, the skin was described as dark blue in color, and ears were purple. Microscopically, the most significant finding was inflammation of blood vessels (vasculitis) in several organs, including the kidney, intestine, and brain. Bacterial culture yielded a moderate to heavy growth of *Erysipelothrix rhusiopathiae*, the causative agent of **swine erysipelas**, from spleen, brain, lung, and lymph node. The owner was referred to his practitioner for the treatment of affected animals, and for the initiation of a vaccination program.

Erysipelas has also been recently diagnosed at the AHC by bacterial culture in a group of **emus**, where the clinical history in the birds was acute death.

## NECROPSY ROOM CASES OF INTEREST continued...

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### Coccidiosis in piglets

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**Coccidiosis (Isospora suis infection)** was diagnosed in a group of five 7 to 10 day-old piglets with diarrhea and dehydration. Typical lesions were observed on microscopic examination of infected portions of distal small intestine. Perhaps one of the most interesting aspects of this case was that coccidial oocysts were readily observed in very large numbers, using a fecal flotation technique. It appears that detecting coccidial oocysts in stool samples from diarrheic neonatal piglets is a worthwhile diagnostic technique that practitioners in the field could adopt for their own use, keeping in mind that the absence of the organism does not necessarily indicate it is not causing the problem - oocyst production may still be too low, or the disease at too early an age, to permit detection by this technique. In any case, microscopic examination of intestinal sections is still strongly recommended. The intestinal sections must be very fresh, to assure that the tiny coccidial organisms may be seen within the still-intact mucosal enterocyte; if these have sloughed or are autolytic, detection becomes much more difficult.

When diagnosed, coccidiosis in piglets may be effectively treated - consult your veterinary practitioner. Good sanitation practices in nursing pens will help to avoid this enteric disease, as the piglets initially acquire the organism from the sow's feces, or from previously contaminated bedding or floor mats.

### Respiratory distress (suspect CAE pneumonia) in dairy goats

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Four mature female dairy goats from a large dairy had died over a three - month period with terminal signs of acute respiratory distress. Three of the 4 animals were heavily pregnant when they became obviously ill. Most of the animals had been treated prior to death, but to no avail. The fourth doe was submitted for necropsy. Gross and microscopic findings indicated a chronic, progressive interstitial pneumonia, that was consistent with caprine arthritis-encephalitis virus (CAE). Blood serum titres on the doe were positive for CAE virus.

CAE was first described as a disease of goats in 1974, and is now recognized as one of the most important of goat diseases. It is caused by an RNA lentivirus related to the maedi/visna virus of sheep. The disease causes brain infection (encephalitis) in young goats from approximately 1 to 4 months of age. CAE-induced arthritis may be seen in older animals, although in cases submitted to the AHML, the clinical history and most notable pathological lesions observed in mature animals are often referable to the respiratory tract, as in the case described here.

Blood testing for antibodies to CAE via an ELISA test will help to detect antibody in animals carrying the virus. These individuals can then be culled. The ELISA test is done routinely at the AHC at the request of goat owners or veterinary practitioners, and is a useful procedure to help reduce the incidence of this virus in a group of animals.

*"There are two means of refuge from the miseries of life: music and cats."*

– Albert Schweitzer

### Vitamin D toxicity in sheep, and in puppies

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A mature, 2 year-old ewe from a flock of 100 animals was submitted for post mortem after showing clinical signs of depression and irregular breathing. The animal had been treated for several days with antibiotics, but response was minimal. Body condition of the animal was very good.

Gross necropsy examination revealed a large volume of clear fluid in the chest cavity, and a limited amount of lung consolidation in the anterior lobes. There was extensive mineralization of the heart valves, and marked mineralization of the aorta.

Microscopic examination of the animal's tissues revealed extensive injury and mineralization in a wide variety of tissues and organs, including the aorta, coronary arteries of the heart, and heart valves. Mineralization of vessels walls was also observed in the stomach and kidney.

Unfortunately, at time of writing, information regarding the actual source of the excess vitamin D in this flock has not yet been relayed back to the pathologist.

Vitamins, including vitamin D, are organic molecules that are needed in small amounts in the diet of higher animals. These molecules serve nearly the same roles in all forms of life. Vitamin D is one of the fat-soluble vitamins, together with the vitamins A, E, and K.

The AHC has diagnosed vitamin D toxicity in a wide variety of species, including pigs, sheep, cattle, rabbits, and various pet species. Cats have very low vitamin D requirements, and accordingly are quite susceptible to toxicity. Over-supplementation of the ration with vitamin D has occurred in some of these cases, either accidentally (due to an error in mixing of the cereal portion of the ration with vitamin supplements) or deliberately, the latter due to the dangerous notion that, if a little vitamin D is good, then more must be better! The effects of vitamin D toxicity can also be cumulative, where normally adequate amounts in various individual dietary sources add up to a toxic amount in total, especially if injectable vitamins have also been utilized.

Recently, vitamin D toxicity was diagnosed in a litter of 4 to 6 week-old Rottweiler puppies. Questioning of the owner for clues as to how the poisoning occurred uncovered the likely source of the toxicity problem. Puppies at 1 - 2 weeks of age normally receive all their nourishment by suckling their mother. In this case however, the owner's desire to encourage growth and thrift in the animals led to feeding them canned milk. This product, intended as a milk supplement for human use only, is fortified with vitamin D. Evidently no oral vitamin preparations had been given to the pups. For the tiny Rottweiler puppies, it is suspected that 'free access' to the canned milk may have led to excessive intake of vitamin D, with subsequent toxicity characterized on post mortem examination by heavy mineralization throughout the lungs, heart, and other tissues. Several littermates died. It is probable that littermate survivors will be handicapped in the future from injury to a wide variety of essential organs, including lung, heart, and kidney.

If there is a useful observation here, it is that vitamin D is a particularly unforgiving compound when animals are exposed to toxic doses, as the injury to vital tissues and organs are severe, and often leads to permanent impairment or even cessation of function. Read label directions carefully when supplementing rations with vitamins or trace minerals, and remember that over-dosage in some instances can lead to serious toxicity problems.

### Fatal necrotizing myositis in a puppy

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Necrotizing myositis (severe inflammation of muscle) was diagnosed on post mortem in a 3 month-old purebred Pointer puppy that had demonstrated clinical signs of hind leg weakness and soreness. The pup had been examined by a veterinarian in the morning, and radiographs were taken to eliminate any possibility of skeletal injury. The temperature of the animal was normal. A pain-killing drug was prescribed to combat the hind limb weakness and soreness, the tentative diagnosis being suspected rear limb trauma, or sprain. The animal died that night, 12 hours after the initial visit to the veterinarian.

Post mortem examination of the puppy revealed a necrotizing myositis (severe muscle tissue infection) in the loin muscle, overlying the right dorsal sacral and tailbone area, and extending around the tailhead to the underlying muscles.

The affected muscle tissue was a deep red colour, at times nearly black, and was sharply delineated from adjacent viable muscle tissue. Bacterial culture yielded a **mixed miscellaneous** growth of organisms, together with a light growth of **Clostridium perfringens**.

On microscopy, the skeletal muscle in affected areas was severely hemorrhagic and edematous, and there was an intense infiltration of neutrophilic inflammatory cells, most of which appeared degenerate or necrotic. There was random fragmentation and lysis of skeletal muscle fibres, and occasionally small clear vacuoles suggestive of gas bubble formation were readily visible. There were also fragments of foreign debris seen within some areas of the muscle sections. Gram stain revealed a few scattered or clustered gram positive cocci and coccobacilli, together with larger, plump bacilli consistent with a *Clostridium sp.* Tissue injury of a secondary nature was also noted in the lung and liver.

The phrase “mixed miscellaneous bacteria” can be very significant in bacterial cultures when referring to areas of muscle injury and inflammation, as can reference to the organism *C. perfringens*. *C. perfringens* generates many bacterial toxins, including white blood cells toxins (leukocidins), as well as enzymes which promote the extension of the infecting organisms by hydrolysis of cell membranes (*Pathogenesis of Bacterial Infections in Animals*, 2nd edition, Gyles and Thoen, 1993). Alpha toxin is the only lethal toxin produced by *C perfringens type A* (the type usually associated with muscle infections). When a sufficient concentration of alpha toxin is present in the blood circulation, blood platelet destruction, lysis of red cells, and widespread damage to capillary vessels in other organs throughout the body, also occurs. The tissue swelling and hemorrhage seen in this pup’s affected muscle tissues is likely related in part to this toxin’s effects on capillary vessels.

Necrotizing myositis is a differential in any animal where there is evidence of limb lameness or soreness, the other two principal categories being injury to the skeletal or nervous systems. Because the animal died so rapidly after the initial examination and treatment, the reported “normal temperature” likely represents a decline of body temperature due to its deteriorating toxemic state. The pup’s temperature had likely been elevated earlier.

This animal was quite bright on examination, which evidently is often the case - many toxemic individuals are reasonably alert until just before death.

## INTERESTING CASES FROM THE NECROPSY ROOM

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### Fatal necrotizing myositis in a puppy continued...

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Necrotizing myositis is a condition that large animal practitioners recognize in the rapidly fatal condition in cattle called **blackleg**, caused by the clostridial organism *C. chauvoei*, or in the other form of necrotizing myositis in cattle called malignant edema, caused by *C. septicum*. There are other variations of this theme, of course, such as the condition called **'big head'** in rams, usually linked to *C. novyi* infection in the soft tissues of the head caused by fighting. At one time, a form of fatal necrotizing myositis was reported in horses after being injected intramuscularly with a deworming agent.

*C. perfringens* is a part of the normal intestinal flora of humans and animals, but is also widespread in soil. Wound contamination by soil or feces may lead to infection with this or related organisms. A "mixed miscellaneous" group of organisms may easily mimic the effects of *C. perfringens*, and conceivably one or both groups of organisms could also have entered the affected muscle tissue of this puppy by a penetrating bite wound. For the veterinary diagnostician, who generally associates *C. perfringens* with alimentary tract infections such as enterotoxemia in sheep, it is worth noting that this organism and its microbial cousins are very capable of producing severe and rapidly fatal muscle lesions in pets as well as in a wide variety of other species.

### Horses and buttercups

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**"A** client called after a number of horses were observed eating buttercups after a killing frost in late September. No abnormal signs were seen in the horses. The owner questioned whether there could be any adverse health effects.

Buttercups grow worldwide and are well known to be toxic. However, there are few reports of popisonings even though they are common in many fields and in hay. The toxic chemical, protoanemonin, is not highly toxic and changes to a non-toxic chemical very quickly after the growing plant is cut. In the growing phase, buttercups are distasteful to livestock but can cause oral and gastrointestinal irritation. Frost would have a similar effect to cutting the plants and letting them dry in hay. The toxin would be quickly changed to a non-toxic product and horses could consume the plants without any problems."

From *Cepton*, Animal Health Newsletter of the Ontario Ministry of Agriculture, Food and Rural Affairs, vol 5, No 4. *Ed's note: This is an interesting commentary from our Ontario colleagues, as it does reflect our own findings on a couple of farms in northern British Columbia, where horses that were obliged to eat a large quantity of standing buttercups, stinging nettles, and other weeds developed sore, focally inflamed areas of the mouth and tongue. All attempts to identify any viral involvement were negative, as was blood serology for equine vesicular stomatitis.*

*"Cats are smarter than dogs. You can't get eight cats to pull a sled through snow".*

**– Jeff Valdez**



## What are Endotoxins?

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Endotoxins are complex lipopolysaccharides that are components of the cell wall of gram-negative bacteria and are released on their disintegration. These compounds have severe systemic effects, including fever, hypotension, hemorrhage, intravascular coagulation, and destruction of neutrophils with release of enzymes.... In cases of overwhelming septicemia, bacterial products and waste products are thought to interfere with host metabolism, often fatally."

– From *Veterinary Pathology*, 6th ed., by TC Jones, RD Hunt, and NW King; 1997, Williams and Wilkins publishers, Baltimore.

## Gut flora dysbiosis and animal disease: a viewpoint

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*J Coates*

Dysbiosis is a term that many of us might ponder, as we continue to discover the links between how and what we feed our animals, and disease syndromes that many of us are called upon to treat or diagnose - sometimes, unfortunately, on post mortem. Dysbiosis refers to an abnormal, or disordered gut flora, and the discussion here is primarily directed toward bacterial flora in the gut, although it could, perhaps just as well, refer to disturbances in fungal or protozoal flora.

One of the most dramatic examples of gastrointestinal dysbiosis, or disruption of normal bacterial intestinal flora, is seen in commercial rabbitries, where young weaners or growers fed an abnormal diet that is too high in carbohydrates, or too low in fiber (or both), develop diarrhea with dietary malabsorption, fluid loss, endotoxin absorption, and enteritis. These animals become unthrifty; and, often dehydrated or emaciated; some will die.

From the studies of researchers, particularly by Cheeke, the fundamental problem is one of a disruption of the normal gut flora of the rabbit (predominantly gram positive organisms) to a gram negative, coliform flora (such as *E coli*). With the proliferation of *E coli*, coliform endotoxin absorption ensues with malabsorption, as there is direct injury to the normal mechanisms of intestinal homeostasis and metabolism. By respecting the rabbit's natural or intrinsic need for fibre in its diet, coupled with care to avoid polluting the lower bowel with excessively high concentrates of carbohydrates, gastrointestinal dysbiosis can usually be avoided.

Other disease syndromes occasionally seen by veterinary practitioners that involve, or are thought to involve, gut flora dysbiosis as a predisposing factor, are idiopathic colitis or colitis X in horses; necrotic enteritis in various poultry and ratite species; and grain overload (chemical rumenitis) in cattle. No doubt there are other animal disease syndromes that may be caused at least partially by an initial gut flora dysbiosis, which then permits the proliferation of other, more harmful and opportunistic organisms. For example, this list may include the intestinal syndrome in feeder pigs known as intestinal adenomatosis, where the intestinal mucosa is severely injured by the local proliferation of an unusual intracellular bacterial organism, *Lawsonia intracellularis*.

If these various syndromes have anything in common, it would be human interference in the natural feeding habits and dietary needs of these animals, usually in a misguided attempt to accelerate growth and feed conversion to animal protein, or to promote performance. Prevention of these conditions then, in part or whole, resides in our acknowledging and maintaining the distinctive dietary needs of various animal species that promote a healthy intestinal flora.

## Use of rabbits in ostrich rearing

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“...Apart from tackling the problems of different climates, such as those in Scandinavia and tropical areas, the economics of farming ostriches in different parts of the world has created different problems to overcome.

In the western world where labour costs are high, the use of the domestic rabbit to help rear ostrich chicks during the first few weeks of their lives has been widely accepted and used in many countries, including Scandinavia, the UK, the Benelux countries and Spain. Presently, the use of rabbits in rearing ostrich chicks is also being tried out in South Africa.

Both ostrich chicks and rabbits have a strong affinity for each other, the rabbit acting as a “dummy” figure.... for the ostrich chicks, as a dummy acts to placate a small child. The rabbit effectively supplements the mother figure and considerably improves the welfare of the newly hatched chick. There is also value in the consumption by the ostrich chicks of the rabbit dung, which not only provides vitamins B and K (night-time white faeces) for the ostrich chick but also inoculates the ostrich chick intestines with beneficial bacteria, so helping to prevent yolk-sac problems and other disease associated with incorrect/poor colonisation of their guts. ..

Empirically, I have found that hand reared dwarf rabbits are the best starting rabbits for day-old hatchlings, the size of the rabbit having to increase as the ostrich chick increases in age. By six to eight weeks of age, the ostrich chick has reared itself off the rabbit and no longer requires the benefit of the “dummy” figure....

..... I recommend that rabbits are used in pairs, either does or neutered bucks, otherwise the ostrich farmer may find that he ends up farming two species rather than one....”

– from a letter by CA Madeiros, to the *Veterinary Record*, June 28th, 1997; p 688. *Please note: these interesting comments are offered only as information, not as a recommendation; the entire letter is available in the Veterinary Record for those wishing to investigate this intriguing topic further. Ed.*

## Canine aggression and human personality traits

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“The aim of the study was to determine whether there is an association between the personality of the owners of English cocker spaniels and the expression of aggressive behaviour by their owners. Two-hundred-and-eighty-five owners of purebred English cocker spaniels completed the Carell 16 Personality Questionnaire..... Analyses of the data using unpaired t-tests revealed that that the owners of high aggression dogs were significantly more likely to be tense ( $P<0.01$ ), emotionally less stable ( $P<0.01$ ), shy ( $P<0.01$ ), and undisciplined ( $P<0.05$ ), than owners of low aggression dogs.”

– excerpts from the abstract of an article by Podberscek AL, Sewrpell JA. Aggressive behaviour in English Cocker spaniels and the personality of their owners. *Vet Record*, July 19,1997: 73 - 76.

*To err is human  
To purr feline.*

– Robert Byrne

## Anecdote of a Roman medical school

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“Asclepiades (c. 124-140 BC) was the first Roman doctor to achieve high fame. He came to Rome from Bithynia and founded a medical school which continued after his death. At first, such schools were the personal following of the doctor and he would take all his students with him on visits. The writer Martial (40-102 AD) commented on this practice in the following manner:

*‘I was lying ill; but you immediately came to me, Symmacchus, accompanied by a hundred students. A hundred hands, frozen by the north wind, examined me. I did not have a fever Symmacchus, but I’ve got one now.’*”

– from *More of Mould’s Medical Anecdotes*, 1989: JW Arrowsmith publishers, Bristol.

## Frederick Banting, discoverer of insulin

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“..... Banting was a remarkably ordinary doctor who had one or two extraordinary ideas. In ideal circumstances, one of those ideas changed the world.

What cannot be doubted is that, in 1922, a small laboratory at the University of Toronto produced an extract that prevented almost certain death when injected into the blood stream of diabetics. The extract, insulin, quickly became the standard treatment for diabetes..... The insulin discovery would go down in history as Canada’s greatest medical innovation.

Banting died tragically in a wartime plane crash in 1941. Before and after the diabetes discovery, he lived a life of respectable ordinariness. It was interrupted, however, by that one spark of inexplicable inspiration that led to the pathbreaking diabetes research.

The insulin discovery, like so many other medical breakthroughs, was doubtless the product of several minds..... All the same, the one ingredient that could not be removed from the historical formula for insulin’s discovery was Frederick Banting.”

– from *The Canadian 100*, by HG Rawlinson & JL Granatstein: Little, Brown, and Co., Toronto, 1997.

Enjoy life - this is not a dress rehearsal.  
*Anon.*

## On Pathology

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“.... Pathology is that branch of medicine which attempts to relate morphologic changes to specific causes. When our understanding of the laws of nature becomes perfect, then it will be possible to predict the effect of a disease-producing agent with as much certainty as it is to measure the force of gravity and predict the course of a falling body. Under what appears to be entirely comparable conditions, one animal survives an infection and one succumbs, one person develops a malignant neoplasm and one does not. We tend to dismiss such biological variations in differences in individual susceptibility ..... However let no one suppose that each unexplained event is, in reality, without adequate cause; it is only because of our incomplete understanding and knowledge of pertinent facts that we tend to group such variable outcomes according to the laws of chance. Too much time has been wasted in considering pathology as a long list of separate observations on diseased animals and tissues. The conditions that occur in health and disease are fully related to each other and are based on chemical and physical laws as constant as in any science.”

– Dr. Hilton Smith, quoted from the 1957 edition of *Veterinary Pathology*, and recorded again for readers of the 6th edition, 1997, by Jones TC, Hunt RD, King NW, Williams and Wilkins publishers; Baltimore, London.

## A viewpoint on Richard Wagner, the composer

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“..... his message is for us, whether we regard ourselves as fundamentally akin to people of most times and places, or whether we take ourselves to be determined by our historical and cultural positioning. What is clear is that Wagner was intent on reanimating myth for modern man, an activity which might either give or restore to us a sense of our possible greatness, and one so fraught with difficulties that there is no need to rehearse them. Wagner..... found intolerable the smallness of contemporary life, its preoccupation with matters which would obviously shrink our souls still further. His life's work is a continuous effort to show how we might gain or regain the dimensions of mystery and potentiality which are certainly missing in a secular age. To accomplish that he took the traditional patterns of tragedy, but repeatedly denied tragic conclusions. His mature works.....are pervaded by tragic feeling, but their resolutions suggest that whatever might be hurled at us, or undermine us from within, there is still to be discovered, or rediscovered, an heroic constituent in human nature which can take anything and manage to survive.”

– from *Wagner*, by Michael Tanner; Harper Collins publishers, 1996.

*“Odd things animals. All dogs look up to you.  
All cats look down to you.*

*Only a pig looks at you as an equal.”*

**– Winston Churchill**