Syllabus

VETERINARY PATHOLOGY DEPARTMENT
ARMED FORCES INSTITUTE OF PATHOLOGY

Wednesday Slide Conference

1977-1978

ARMED FORCES INSTITUTE OF PATHOLOGY

Washington, D.C. 20306

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Syllabus

VETERINARY PATHOLOGY DEPARTMENT, AFIP,
WEDNESDAY SLIDE CONFERENCE
1977-1978

100 microslides

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ARMED FORCES INSTITUTE OF PATHOLOGY

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PREFACE

The Department of Veterinary Pathology, Armed Forces Institute of Pathology, has conducted the annual Wednesday Slide Conference for more than two decades. The cases presented each Wednesday throughout the academic year are also distributed to 80 active participants, including military and civilian veterinary pathologists throughout the United States and Canada as well as several foreign countries. The list of active contributors continues to grow. The diagnosis for each case and a synopsis of the discussion for most cases are forwarded to participants weekly.

This study set has been assembled in an effort to make the material presented at our weekly conferences available to a wider range of interested pathologists and other scientists.

A selection of 99 cases, including 100 slides, has been made from the 111 cases studied during the 1977-1978 conferences.

We wish to thank each contributor for his or her participation and for the permission to use cases in this study set.

LIST OF SLIDES

Slide number	Animal	Tissue	Diagnosis
1	Mangabey	Colon	Aspergillus colitis
2	Cat	Skin	Cutaneous pheeosporotrichosis
3	Pig	Nasal turbinate	Inclusion-body rhinitis
4	Pig	Ileum	Porcine proliferative ileitis
5	Horse	Lung	Granulomatous pneumonia (*Histoplasma capsulatum*)
6	Pig	Liver	Corkscrew toxicity
7	Sheep	Kidney	Mesangiocapillary glomerulonephy of fine sheep, explicit
8	Dog	Brain	Canine toxoplasmosis
9	Guinea pig	Skin, lymph node	Cervical lymphadenitis
10	Horse	Brain	*Micrococcus celetrix* encephalomeningitis
11	Boa constrictor	Liver	Visceral gout
12	Cow	Kidney	Malignant catarrhal fever
13	Green Amazon parrot	Liver	Hepatic necrosis (*Salmonella* sp.)
14	Rat	Lung, heart	*Corynebacterium kutscheri*

15	Dog	Spinal cord	Pantopaque leptomeningitis
16	Horse	Small intestine	Cryptosporidiosis
17	Dog	Mass	Solar dermatitis; squamous cell carcinoma
18	Horse	Lung	Granular cell tumor (myoblastoma)
19	Rhesus monkey	Spleen	Simian hemorrhagic fever
20	Guinea pig	Mammary gland	Necrotizing mastitis
21	Cattle	Muscle	Cysticercus bovis
22	Rat	Skin	Vibrissaeless rat (Pemphigus)
23	Dog	Mass	Tricholeмmoma
24	Pig	Kidney, liver	Leptospirosis
25	Macaca arctoides	Placenta	Placenta extrachorialis
26	Cat	Lung	Feline infectious peritonitis
27	Bos taurus	Stomach	Cryptosporidium
28	Pig	Brain	Edema disease
29	Dog	Mass	Metastatic basal cell tumor (AFIP--adenocarcinoma, malignant form of sweat gland spiradenoma)
30	Rat	Salivary gland	Sialoadenitis
31	Horse	Kidney	Abscess; Actinobacillus equuli
32	Dog	Spinal cord	Primary reticulosis
33	Budgeriger	Kidney	Transitional cell carcinoma
34	Cat	Heart	Feline hypertrophic cardiopathy
35	Rat	Ear	Carcinoma of Zymbal's gland
36	Dog	Skin	Hypopituitarism
37	Horse	Muscle, small intestine	Purpura hemorrhagica
38	Cat	Mammary gland	Feline mammary hypertrophy (fatal fibroadenomatous change)
39	Macaca fascicularis	Kidney	Papillary cyst adenocarcinoma
40	Dog	Peritoneum	Peritonitis; Actinomyces sp.
41	Guinea pig	Bone	Osteoarthritis, ankylosis of stifle joint
42	Horse	Pituitary	Pituitary adenoma of pars intermedia
43	Cat	Brain	Feline ischemic encephalopathy
44	Mouse	Liver, lung	Hepatocellular carcinoma
45	Dog	Brain	Cerebral granuloma; Cysticercus cellulosa

46	Horse	Mass	Gastric squamous cell carcinoma
47	Horse	Nasal vestibule	Nasal polyp
48	Pig	Brain, lung, heart	Fibrinopurulent meningitis (*Hemophilus* sp.)
49	Rat	Eye	Light-induced retinal degeneration
50	Pigeon	Liver	Herpesvirus infection of pigeons
51	Turkey	Liver, cecum	*Histomonas meleagridis*
52	Rock hopper penguin	Liver	Malaria; *Plasmodium relictum*
53	Dog	Pancreas	Islet cell carcinoma
54	Horse	Thymus	Equine rhinopneumonitis virus abortion
55	Goat	Brain	Listeriosis
56	Sea otter	Lung	Coccidioidomycosis
57	Flounder	Pancreas, hepatopancreas	Cryptobiosis
58	Cattle	Brain	Hereditary neuraxial edema in Hereford calves
59	Guinea pig	Colon	Colitis; *Eimeria caviae*
60	Pigeon	Proventriculus	*Tetrameres americana*
61	Mouse	Liver	Mouse hepatitis virus (MHV-2)

62	Tiger	Brain	*Blastomyces dermatitidis*
63	Dog	Mass	Adenocarcinoma, apocrine anal glands
64	Bullfrog	Bone	Fibrous osteodystrophy of nutritional origin
65	Giant grouper	Heart	Mesothelioma
66	Knot	Pancreas, small intestine, kidney	Besnoitia-like organism
67	Dog	Heart	Lymphosarcoma
68	Cat	Small intestine	Globule leukocyte tumor
69	Cat	Liver	Intrahepatic bile duct cystadenoma
70	Dolphin	Brain	Cerebral trematodiasis (*Nasitrema* sp)
71	Rabbit	Ear	Ear mites; *Psoroptes cuniculi*
72	Horse	Penis	Parasitic granuloma; *Habronema* sp
73	Rat	Spinal cord	Hemorrhagic myelomalacia (trauma)
74	Snake	Colon	*Entamoeba invadens*
75	Panda	Skin	Dermatophytosis (ringworm)
76	Parakeet	Kidney	Embryonal nephroma
77	Cattle	Mass	Uterine adenocarcinoma metastatic to lung
78	Dog	Kidney	Ethylene glycol intoxication

79	Cattle	Brain, kidney	Cerebral babesiosis; *Babesia bovis* (Argentina)
80	Dog	Skin	Cutaneous lymphoma
81	Dog	Heart	Chagasic myocarditis; *Trypanosoma cruzi*
82	Cynomolgus monkey	Skin	Eosinophilic granulomatous rhinitis; *Anatricosoma cynomolgi*
83	Dog	Small intestine	Intestinal lymphangiectasis, malabsorption, protein losing enteropathy
84	Cattle	Brain	Mannosidosis
85	Cattle	Pancreas, lymph node	Mannosidosis
86	Liver	Heart	Haemotropic disease
87	Rat	Testes	Interstitial cell tumor, mesothelioma
88	Cow	Mammary gland	Mycotic mastitis
89	Hamster	Liver	Experimental Rift Valley fever
90	Cat	Lung	Experimental *Paragonimus kellicotti* infection
91	Dog	Mass	Extra-adrenal paraganglioma (Chemodectoma)
92	Horse	Liver	Tyzzer's disease
93	Cattle	Skin	Dermatophilosis; *Dermatophilus congolensis*
94	Pig	Spinal cord	Porcine cerebrospinal lipodystrophy (GM_2 gangliosidosis)
95	Cat	Mass	Bronchiolar-alveolar cell carcinoma (AFIP--papillary adenocarcinoma)
96	Goat	Liver, thymus	Caprine herpesvirus abortion
97	Mouse	Lung	Lungs of the Wotheaten mouse
98	Pig	Brain	Edema disease
99	Rat	Mass	Mesothelioma (AFIP--papillary cyst adenoma)
100	Dog	Mass	Melanoma (benign)

COMMENTARY ON SLIDES

Slide 1

History. Tissue from a Mangabey that died following a gastrointestinal disturbance of approximately 10 days' duration.

Diagnosis. Colitis, necrohemorrhagic, diffuse, severe, colon, Mangabey, (Cercocebus sp.) probably caused by Mucor sp. or Aspergillus sp.

Comment. The tendency to invade blood vessels is considered characteristic of Phycomycetes. Hyphal morphology varies considerably in many deep mycoses; therefore, culture or FA testing is required for a definitive diagnosis. In this case, FA tests on paraffin-embedded blocks (performed by Dr. Kaplan, CDC, Atlanta, GA) revealed Aspergillus sp. antigens. Of interest is the fact that many areas of infected muscle were without cellular reaction to the organism. The fact that the organism stained relatively well with hematoxylin and eosin led many attendees to give more consideration to Mucor sp. than to Aspergillus sp.

Contributor. Comparative Pathology Division, Armed Forces Radiobiology Research Institute, Bethesda, Maryland.

Slide 2

History. Tissue mass from the carpus of a short-haired adult female domestic cat.

Diagnosis. Dermatitis, pyogranulomatous, severe, subcutis, skin, feline; etiology--a chromomycotic organism, probably Phialophora sp.

Comment. A diagnosis of phaeosporotrichosis was made based on the appearance of the organism in paraffin-stained tissue. Unfortunately, the organisms were not identified by culture.

Suggested reading. Emmons, C. W., Binford, C. H., Utz, J. P., and Kwon-Chung, K. J.: Medical Mycology, ed. 3. Philadelphia, Lea & Febiger, 1977.

Contributor. Department of Pathology, Syntex Research, Palo Alto, California.

Slide 3

History. Tissue from a 3-week-old pig. This pig died of respiratory distress. Twenty-seven out of 150 pigs in the herd were having difficulty breathing. At necropsy there was a fibrinonecrotic membrane lining the nasal sinuses.

Diagnosis. Rhinitis, nonsuppurative, diffuse, severe, nasal turbinate, porcine; etiology—cytomegalovirus infection (inclusion-body rhinitis).

Contributor. College of Veterinary Medicine, Veterinary Pathology Department, University of Missouri, Columbia, Missouri.

Slide 4

History. Tissue from a pig submitted alive for laboratory examination. It was one of 600 feeder pigs. In addition to respiratory disease (rhinitis and pneumonia), a few (no more than five) pigs had blood-tinged and/or tarry stools or were found dead with no signs of disease during the last 3 weeks of life.

Diagnosis. Ileitis, proliferative, diffuse, moderate, ileum, porcine.

Comment. Campylobacter sputorum (subspecie mucosalis) has been isolated from animals with this type of lesion, while it has not been shown to be present in normal animals.

Suggested reading. Rowland, A. C., and Lawson, G. H. K.: Porcine intestinal adenomatosis: A possible relationship with necrotic enteritis, regional ileitis and proliferative haemorrhagic enteropathy. Vet. Rec. 97: 178–180, 1975.

Contributor. Veterinary Science Department, South Dakota State University, Brookings, South Dakota.

Slide 5

History. Tissue from a foal aborted 2 weeks prior to the estimated date of parturition.

Diagnosis. Pneumonia, granulomatous, diffuse, severe, lung, equine; etiology—Histoplasma capsulatum.

Comment. Congenital infection with Histoplasma sp. is considered to be rare. Histoplasma capsulatum was identified in tissues by GMS stain and confirmed by CDC using the immunofluorescence technique. Unusual in this case is the presence of organisms within giant cells but not within individual macrophages as would customarily be expected.

Contributor. Department of Veterinary Medicine, Oregon State University, Corvallis, Oregon.

Slide 6

History. Tissue from an unconfined pig that died of acute illness.

Diagnosis. Necrosis and congestion, centrilobular, acute, severe, liver, porcine; etiology--probably toxin or severe acute cardiovascular insufficiency.

Comment. Considered in the differential diagnoses were clay-pigeon (coal-tar pitch) poisoning, gossypol intoxication, and vitamin E/selenium deficiency. Clay-pigeon poisoning and vitamin E/selenium deficiency would have a patchy distribution. If only the liver were available for examination, differentiation of gossypol intoxication and cocklebur (Xanthium italicum et spp) intoxication would be more difficult if not impossible. This section is from a 40-lb barrow that had eaten 136.29g (0.75% of its body weight) of whole cocklebur sprouts (cotyledon stage). Death occurred 12 hours after eating the plants.

Contributor. Veterinary Diagnostic and Investigational Laboratory, Tifton, Georgia.

Slide 7

History. Tissue from a 3-year-old emaciated ewe which was found prostrate and febrile during a hot summer day and was put to death.

Diagnosis. Glomerulonephritis, membranoproliferative, diffuse, moderate, kidney, ovine, with probable amyloid deposition.

Comment. Gross necropsy revealed serous atrophy of fat, several foci of fat necrosis in the greater omentum, and several small (2 to 3 cm) abscesses in the liver, left kidney and mesenteric lymph nodes. Moderate numbers of strongyles were present in the stomach. The fibrinous eosinophilic material uniformly lining the glomerular capillaries is collagen, i.e. mesangiocapillary glomerulosclerosis. This is reportedly the typical finding in Finn sheep with glomerulopathy. Focal deposition of amyloid is also present, probably associated with the chronic antigenic release caused by Corynebacterium pseudtuberculosis (ovis) in the abscesses. Foci of amyloid stained strongly with Thioflavin T and Congo red stains.

Suggested reading. Angus, K. W., Gardiner, A. C., Morgan, K. T., and Gray, E. W.: Mesangiocapillary glomerulonephritis in lambs. J. Comp. Pathol. 84: 319-330, 1974.

Contributor. National Animal Disease Laboratory, USDA/ARS, P. O. Box 70, Ames, Iowa.

Slide 8

History. Tissue from a 2-month-old female mongrel that was quarantined for rabies observation. Rabies control personnel administered distemper, hepatitis, and leptospirosis vaccines and dipped the dog for brown dog tick. The dog became sick the day of arrival and died late the next day. It was first discovered in a comatose state 30 minutes after dipping. It had a subnormal rectal temperature and hindleg paralysis. Treatment over the next 24 hours consisted of three large (30 ml) doses of Ringer, plus Nirillin, atropine, atropine and lactated Ringer's solution.

Diagnosis. Leptomeningitis, nonsuppurative, diffuse, mild, brain, canine; etiology--Babesia canis.

Comment. Proof of canine babesiosis was established by electron microscopic examination of ultra-thin sections of the brain. Canine babesiosis is a common disease in desert communities of Arizona where it is highly associated with heavy infestations of brown dog ticks. This dog was

sick before quarantine. Its caretaker suspected exposure to cleaning fluids or insecticides at home as the cause of death. The disease is almost never diagnosed at postmortem examination, and only the unusually heavy parasitemia made diagnosis possible in this case. Babesia organisms often localize in the blood vessels of selected organs, i.e. heart, stomach, kidney, liver or brain. This has led to the disease being called "organ babesiosis" in Africa. Vessels may be occluded to the point of severe thrombosis. Canine babesiosis is most common in the Southwestern United States as well as Hawaii.

Contributor. Department of Veterinary Science, University of Arizona, Tucson, Arizona.

Slide 9

History. Tissue from a guinea pig in a long-term experimental study that was found to have a palpable mass in the ventral cervical area.

Diagnosis. Abscess, cervical, subcutaneous tissue, skin, dermis and stratum, guinea pig; Adenitis, cervical, suppurative, diffuse, moderate, lymph node.

Comments. Cervical lymphadenitis is often associated with high-roughage rations, wood chewing and long incisor teeth. No culture was attempted because the case was presented as fixed tissue. Bacteria, i.e. Streptococcus sp. are the usual etiologic agents.

Suggested reading. Rigby, C.: Natural infections of guinea pigs. Lab. Anim. 10: 119-142, 1976.

Contributor. Bureau of Biologics, Division of Pathology, Food & Drug Administration, Bethesda, Maryland.

Slide 10

History. Tissue from a horse which circled, staggered and demonstrated "head-pressing" prior to prostration. Clinical signs were present for 2 days before the animal was killed when death was imminent.

Diagnosis. Meningoencephalitis, granulomatous, multifocal, mild, brain, equine; etiology--Micronema deletrix.

Contributor. Veterinary Diagnostic & Investigational Laboratory, Tifton, Georgia.

Slide 11

History. Tissue from a female boa constrictor (Constrictor constrictor). The owner had been administering medication (Gentamicin) subcutaneously to the boa for approximately 2 weeks prior to the necropsy. The last injection was 14 days prior to necropsy.

Diagnosis. Necrosis with gouty tophi, multifocal, moderate, liver, boa constrictor (Constrictor constrictor); etiology--Gentamicin toxicity.

Comment. The lesions represent what a snake and other reptiles may get when a mammalian therapeutic dosage regime (5 mg/Kg q.d. 12-24 h.) is administered. A more appropriate dosage for snakes and reptiles is 2.5 mg/Kg q.d. 72 h., assuring that the animal is adequately hydrated. The half-life of Gentamicin in mammals is 5 hours, while in the snake it is 90 hours.

Suggested reading. Montali, R. J., Bush, M., and Saeller, J. M.: The pathology of nephrotoxicity of gentamicin in snakes. Vet. Pathol. 16: 108-115, 1979.

Contributor. U. S. Army Medical Research Institute of Infectious Diseases, Fort Detrick, Maryland.

Slide 12

History. A large central Arizona dairy had recently added a number of cows that originated from a California dairy located immediately adjacent to an African game park. The Arizona dairy had also recently been invaded for several hours by ewes that escaped from a neighboring pasture. Over a period of several weeks a total of 12 adult cows, members of the original Arizona dairy herd, became ill and died.

Diagnosis. Nephritis, interstitial, nonsuppurative, focally disseminated, mild to moderate with mild fibrinoid necrosis of smaller arteries, kidney, bovine, compatible with malignant catarrhal fever.

Comment. While a herpes virus has been shown to be the cause of malignant catarrhal fever in Africa (Wildebeest), a virus has not yet been isolated and demonstrated as the cause of the disease in the United States.

Contributor. Department of Veterinary Science, University of Arizona, Tucson, Arizona.

Slide 13

History. Tissue from an 8-week-old green-cheeked Amazon parrot from a flock of 24 parrots, 7 of which had died. Grossly, an enlarged friable liver and an enlarged mottled spleen were noted.

Diagnosis. Necrosis, subacute, multifocal, moderate to severe, liver, Amazona viridigenalis (green-cheeked Amazon parrot); etiology-- Salmonella typhimurium.

Comment. The owner of the pet shop that suffered the losses obtained the young birds from a source flock through a jobber.

Contributor. Department of Veterinary Science, University of Arizona, Tucson, Arizona.

Slide 14

History. Tissue from two rats which showed signs of anorexia and lethargy. At necropsy, lesions were confined to the thoracic viscera.

Diagnosis. Pneumonia with abscess formation and fibrinous pleuritis, anterior, lung, rat; etiology--Corynebacterium kutscheri. Pericarditis, nonsuppurative, diffuse, moderate to severe, heart; etiology--Corynebacterium kutscheri.

Comment. The lesions in the lung are similar to those seen in chronic respiratory disease in rats. In addition to these lesions, granulomas with caseous necrosis were present and were consistent with those seen in Corynebacterium kutscheri infection in rats.

Contributor. Department of Comparative Medicine, The Milton S. Hershey Medical Center, Pennsylvania State University, Hershey, Pennsylvania.

Slide 15

History. Tissue from an experimental dog in which an iatrogenic lesion was reproduced.

Diagnosis. Leptomeningitis, granulomatous, diffuse, moderate to severe, spinal cord, canine.

Comment. Pantopaque is widely used for myelography in humans with few undesirable side effects. Dogs sometimes develop a granulomatous meningitis after Pantopaque myelography; therefore, other types of contrast media are indicated for this species. Radiographs taken of paraffin-embedded blocks from both spontaneous and experimental cases revealed contrast material in the more intense meningeal lesions.

Contributor. Comparative Pathology Division, Armed Forces Radiobiological Research Institute, Bethesda, Maryland.

Slide 16

History. Tissue (jejunum) taken at necropsy from a 34-day-old male Arabian foal. The animal was a combined immunodeficient foal and died of adenoviral and bacterial infections and dehydration associated with chronic disease.

Diagnosis. Enteritis, catarrhal, diffuse, mild with mild villous atrophy and blunting, small intestine, equine; etiology--Cryptosporidia sp.

Comment. Some sections also contained adenoviral inclusion bodies in intestinal epithelial cells.

Contributor. Department of Pathology, College of Veterinary Medicine, Colorado State University, Fort Collins, Colorado.

Slide 17

History. Tissue from the posterior abdomen of a 7-year-old female beagle. The animal was from a large colony housed in outdoor kennels.

Diagnosis. Squamous cell carcinoma, skin, beagle, canine.

Comment. The chronic dermatosis and neoplastic growth is related to chronic exposure of this fair-skinned animal to sunlight.

Suggested reading. Hargis, A. M., Thomassen, R. W., and Priester, R. D.: Chronic dermatosis and cutaneous squamous cell carcinoma in the beagle dog. Vet. Pathol. 14: 218-228, 1977.

Contributor. College of Veterinary Medicine and Biomedical Sciences, Dept. of Pathology, Colorado State University, Fort Collins, Colorado.

Slide 18

History. Tissue from the left lung of an Arabian mare that was killed following an unremitting progressive ataxia. The majority of the lung was very firm at necropsy and contained a streptococcal abscess in the apical portion.

Diagnosis. Granular cell myoblastoma, lung, Arabian mare, equine.

Comment. All six reported equine cases have been in the lung, while the majority of the canine cases have been in the tongue. Several granular cell tumors were recently reported in the brains of aging BN/Bi rats. Though the granular cell tumor has a rather characteristic morphology, it occasionally is difficult to differentiate from alveolar soft-part sarcoma at the light microscopic level. Granular cell tumors are presently considered to share a common origin with Schwann cells. Their exact origin is not known, and it is

quite possible some non-neoplastic granular cell lesions are of smooth muscle origin.

Suggested reading. Hollander, C. F., Burek, J. D., Boorman, G. A., Snell, K. C., and Laqueur, G. L.: Granular cell tumors of the central nervous system of rats. Arch. Pathol. Lab. Med. 100: 445-447, 1976.

Contributor. Comparative Pathology Division, Armed Forces Radiobiological Research Institute, Bethesda, Maryland.

Slide 19

History. Tissue from a male rhesus monkey which was found dead. Three days before death anorexia had been observed. Gross examination of the carcass was not remarkable. No evidence of dehydration or nasal discharge was present. There were multiple areas of hemorrhage observed within the lung, and a 2-cm clot was present in one lobe. Extensive areas of petechiation were observed in the muscles of the lower limbs; however, ecchymotic hemorrhages were absent. Prominent subserosal hemorrhage was observed in the duodenum, throughout the small intestine, and most prominently in the cecum. Focal hemorrhage was observed under the capsule of the testicle. Hemorrage was observed within the lumen of the small intestine but was absent from the colon. The spleen was markedly enlarged, firm and dry. The liver was enlarged and mottled.

Diagnosis. Necrosis, lymphoid, diffuse, severe with sinusoidal fibrin deposition, spleen, rhesus (Macaca mulatta); etiology--virus of simian hemorrhagic fever.

Comment. Failure of the virus of simian hemorrhagic fever to kill laboratory mice is a practical method for differentiating the disease from Kyasanur Forest Disease.

Contributor. Hazleton Laboratories, 9200 Leesburg Pike, Vienna, Virginia.

Slide 20

History. Tissue from an adult female Moen-Chase guinea pig from a breeding colony which was put to death because of a firm 1 cm x 1 cm x 3 cm mass in the left inguinal region.

Diagnosis. Mastitis, necrotizing, subacute, diffuse, severe, mammary gland, guinea pig; etiology--Escherichia coli.

Contributor. Letterman Army Institute of Research, Presidio of San Francisco, California.

Slide 21

History. Tissue from two feedlot cattle sent to slaughter from a large feedlot in the Southwestern United States. Approximately 20 percent of the cattle were infected.

Diagnoses. Myositis, granulomatous, eosinophilic, focal, moderate, skeletal muscle, bovine; etiology--compatible with Cysticercus bovis. Myocarditis, granulomatous, focal, moderate, heart, bovine; etiology--compatible with infection with Cysticercus bovis.

Comment. The presence of Sarcocystis sp. in the skeletal muscle was noted. Sarcocystis sp. is more likely to produce an eosinophilic myositis without the granulomatous response seen in this case.

Contributor. Division of Comparative Pathology, Department of Veterinary Pathology, Armed Forces Institute of Pathology, Washington, D.C.

Slide 22

History. Tissue from a male rat with generalized alopecia, skin blisters and scabs. The animal's growth rate was normal.

Diagnosis. Dermatitis, ulcerative, diffuse, moderate with bulla formation and alopecia, skin, rat.

Comment. This lesion is characteristic of a rat mutant called "vibrisseless". The lesions are morphologically compatible with pemphigus vulgaris described in both man and dog.

Suggested reading. Luttner, M. K., and Hansen, C. T.: Skin blisters and hair loss in a rat mutant called vibrisseless (vb). J. Invest. Dermatol. 63: 212, 1975.

Contributor. National Cancer Institute, Bethesda, Maryland.

Slide 23

History. Tissue removed from the head of a 1-year-old female shepherd cross. It appeared to be a cystic mass and measured 2 cm x 1 cm x 1 cm.

Diagnosis. Trichilemmoma (variant of trichoepithelioma), skin, head, mixed breed, canine.

Comment. Although the World Health Organization International Histological Classification of Tumors of Domestic Animals does not yet recognize this tumor as a distinct entity in animals, we feel this case sufficiently resembles the description found in the human literature to warrant classification as a trichilemmoma.

This is a tumor of the outer root sheath. It is relatively uncommon in the dog. The key feature of these tumor cells is their clear (glycogen-rich) cytoplasm. Another primary skin tumor with clear cells is the hidradenoma. This tumor should be considered in a differential diagnosis, but typically it would contain some glandular spaces.

Typically, the trichilemmoma has a distinct basement membrane, and there is generally some palisading of the basal layer of tumor cells. Centrally, some keratinization may be evident. While central keratinization is not evident in this tumor, some squamous metaplasia is present. Melanocytes are also occasionally seen in association with the tumor cells.

In man, two variants of the trichilemmoma are recognized—a lobular form (similar to this type but usually with a prominent central hair follicle) and a solid form, felt to be a tumor of the follicular infundibulum. These tumors are usually found on the face.

Suggested reading. Brownstein, M. H., and Shapiro, L.: Tricholemmoma, analysis of 40 new cases. Arch. Dermatol. 107: 866, 1973.

Contributor. Division of Laboratory Animal Medicine, University of Rochester, Rochester, New York.

Slide 24

History. Tissue from an 80-lb pig, one of several in a herd of 40 pigs with fever, lethargy, anorexia and prostration. Postmortem examination revealed a swollen hyperemic liver and petechial hemorrhages on the kidneys and endocardium.

Diagnoses. Nephritis, interstitial, nonsuppurative, diffuse, moderate to severe, kidney, porcine; etiology--Leptospira pomona. Degeneration, hydropic, diffuse, minimal with focal accumulations of mononuclear cells, liver; etiology--Leptospira pomona.

Comment. Leptospira pomona was cultured from the blood, liver and kidney.

Contributor. National Animal Disease Laboratory, Ames, Iowa.

Slide 25

History. Tissue from a Macaca arctoides which was removed by cesarean section. The fetus was within 3 days of term.

Diagnosis. Thrombosis, hemorrhage and necrosis, multifocal, mild to moderate, placenta, Macaca arctoides.

Comment. Consultants from the Department of Gynecologic and Breast Pathology, AFIP, confirmed that the microscopic lesions were compatible with a diagnosis of placenta extrachorialis; however, the diagnosis is more easily rendered from the gross specimen.

Suggested reading. Scott, J. S.: Placenta extrachorialis. A factor in antepartum hemorrhage. J. Obstetrics & Gynaecology of the British Commonwealth 67: 904-918, 1960.

Contributor. Department of Comparative Medicine, Milton S. Hershey Medical Center, Pennsylvania State University, Hershey, Pennsylvania.

Slide 26

History. Tissue from a female domestic short-hair cat.

Diagnoses. Vasculitis, necrotizing, granulomatous, diffuse, mild to moderate, arteries and veins, lung, domestic short-hair, feline; etiology--virus of feline infectious peritonitis. Pleuritis, fibrinous, patchy, mild, pleura, lung. Edema, pulmonary, mild, alveoli, lung.

Comment. Similar vascular lesions that varied in severity were present in the liver, kidney, heart, pancreas, stomach, ileum, colon, urinary bladder, choroid, meninges and eyes. Bacterial cultures of the liver were negative, and no organisms were seen in tissue sections. In electron photomicrographs, viral particles (90 to 100 nm), which were morphologically similar to those described in feline infectious peritonitis, were seen within cytoplasm and cytoplasmic vesicles of macrophages in the lung.

Suggested reading. Montali, R. J., and Strandberg, J. D.: Extraperitoneal lesions in feline infectious peritonitis. Vet. Pathol. 9: 109-121, 1972.

Contributor. United States Army Medical Research Institute of Infectious Diseases, Fort Detrick, Maryland.

Slide 27

History. Tissue from a pet male boa constrictor that developed a diarrhea which was unresponsive to Ampicillin. A fecal culture yielded Pseudomonas which was sensitive to Gentamycin. The snake was treated with Gentamycin but died. Gross necropsy revealed gangrenous enteritis and mouth rot, and a smear of gut contents contained motile organisms which looked like Trichomonas sp.

Diagnosis. Gastritis, hypertrophic, diffuse, moderate, stomach, boa constrictor (Constrictor constrictor).

Comment. This condition has been reported to be associated with Cryptsporidium.

Suggested reading. Brownstein, D. G., Strandberg, J. D., Montali, R. J., Bush, M., and Fortner, J.: Cryptosporidium in snakes with hypertrophic gastritis. Vet. Pathol. 14: 606-617, 1977.

Contributor. Comparative Pathology & Surgery Branch, Biomedical Laboratory, Chemical Systems Laboratory, Edgewood Area, Aberdeen Proving Ground, Maryland.

Slide 28

History. Tissue from a 9-week-old piglet which was submitted alive for laboratory examination. It had been sick for 12 days and had been showing anorexia, circling, and mild opisthotonos. It was one of four which exhibited similar signs out of 67 piglets weaned at 4 weeks of age.

Diagnosis. Encephalitis, with necrotizing arteritis, nonsuppurative, diffuse, moderate to severe, brain, porcine; etiology--edema disease, late or recurrent form.

Comment. Grossly, lesions consisted of periocular edema and dehydration. Mercury poisoning was considered in the differential diagnosis.

Suggested reading. Clugston, R. E., Nielsen, N. O., and Smith, D. L. T.: Experimental edema disease of swine (E. coli Enterotoxemia). III. Pathology and pathogenesis. Can. J. Comp. Med. 38: 34-41, 1974.

Contributor. Veterinary Science Department, South Dakota State University, Brookings, South Dakota.

Slide 29

History: Tissue (prescapular lymph node) from a 9-year-old Doberman. This dog had a 3-cm mass of unknown duration on the lateral chest wall.

Diagnosis. Adenocarcinoma, metastatic, lymph node; compatible with the malignant form of sweat gland spiradenoma.

Comment. The tumor was composed of basaloid type cells. In some areas these cells had formed tubules lined by two cell layers that were typical of those seen in sweat gland spiradenomas.

Contributor. College of Veterinary Medicine, University of Missouri, Columbia, Missouri.

Slide 30

History. Tissue from a juvenile male Sprague-Dawley rat which was submitted for necropsy because of a subcutaneous mass ventral to the larynx. The mass measured 1.5 x 1.0 x 0.33 cm.

Diagnosis. Sialoadenitis, subacute, diffuse, severe with ductular necrosis and interstitial edema, submaxillary salivary gland, rat; etiology--coronavirus.

Comment. Similar lesions were present in the harderian gland of this rat. The squamous metaplasia seen within some of the ducts was indicative of a reparative lesion.

Suggested reading. Jacoby, R. O., Bhatt, P. N., and Jonas, A. M.: Pathogenesis of sialodacryoadenitis in gnotobiotic rats. Vet. Pathol. 12: 196-209, 1975.

Contributor. Letterman Army Institute of Research, Presidio of San Francisco, California.

Slide 31

History. Tissue from a 4-month-old male thoroughbred foal. The foal ran into a post approximately two months prior to its death, resulting in injury to his head and shoulder. He subsequently developed an episode of pneumonia, which responded to therapy at the time. Gradual deterioration in his condition with intermittent diarrhea continued until death.

Diagnosis. Nephritis, suppurative, multifocal, moderate to severe, kidney, equine; probable etiology--Actinobacillus equuli.

Comment. Actinobacillus equuli was isolated in pure culture from the kidney. Pulmonary abscesses were observed at the time of necropsy, but no organisms were isolated from those lesions.

Contributor. Division of Comparative Pathology, University of Florida, Gainesville, Florida.

Slide 32

History. Tissue from an 8-year-old spayed female dachshund. The animal was presented with profound depression, a temperature of 99° F. and paraplegia. It started having difficulty negotiating stairs 3 to 4 weeks prior to presentation, and its condition progressively deteriorated. Clinical laboratory results were not abnormal.

Diagnosis. Leptomeningomyelitis, granulomatous, diffuse, moderate, spinal cord, canine; compatible with canine reticulosis.

Suggested reading list.

Koestner, A., Zeman, W.: Primary reticuloses of the central nervous system in dogs. Am. J. Vet. Res. 23: 381-393, 1962.

Luginbuhl, H., Fankhauser, R., and McGrath, J. T.: Spontaneous neoplasms of the nervous system in animals. Prog. Neurol. Surg. 2: 85-164, 1968.

Contributor. College of Veterinary Medicine & Biomedical Sciences, Department of Pathology, Colorado State University, Fort Collins, Colorado.

Slide 33

History. Tissue from a male budgerigar which had been acquired by the owner 1 year prior to presentation. It had a 1-month history of poor appetite, progressive weakness and rapid breathing.

Diagnosis. Carcinoma, tubular, kidney, budgerigar, Melopsittacus undulatus.

Contributor. Department of Pathology, The Johns Hopkins University, Baltimore, Maryland.

Slide 34

History. Tissue from a 3-year-old domestic cat which died en route to a hospital. The owner found the cat in acute respiratory distress with severe cyanosis of his tongue. The animal was very well a few hours before symptoms appeared. The specimens are from the left ventricular wall and lungs.

Diagnosis. Cardiomyopathy, hypertrophic, degenerative, diffuse, moderate, heart, feline with mild diffuse pulmonary edema.

Comment. Gross pathologic findings included a severe congestion and edema of the lungs and a left atrial dilatation with a marked hypertrophy of the left ventricular wall, papillary muscles, and septum which caused a pronounced narrowing of the left ventricular cavity.

Microscopically, the muscle fibers of the left ventricle were increased in size with large rectangular nuclei. Several of these fibers showed a bizarre arrangement, and there were focal areas of interstitial fibrosis. The lungs were congested and edematous, and heart failure cells were present.

Suggested reading. Tilley, L. P., Liu, S. K., Gilbertson, S. R., Wagner, J. M., and Lord, P. F.: Primary myocardial disease in the cat. Am. J. Pathol. 87: 493-513, 1977.

Contributor. Department of Pathology and Microbiology, Faculty of Veterinary Medicine, University of Montreal, St. Hyacinthe, P. Q. Canada.

Slide 35

History. Tissue from an ulcerated mass on the side of the heart of a 57-week-old Sprague-Dawley Charles River CDBS rat. The rat was on test; however, the mass was not believed to be treatment related.

Diagnosis. Carcinoma of Zymbal's gland with squamous differentiation, ear, rat.

Comment. These neoplasms are occasionally seen spontaneously in aged rats of several strains. They can also be experimentally induced by various carcinogens, often administered in the diet. These neoplasms can invade the skull and brain and also metastasize.

Suggested reading. Turusov, V. S. (Ed.): Pathology of Tumours in Laboratory Animals, vol. I, Tumours of the Rat (Part 1). W.H.O. International Agency for Research on Cancer, 1973, pp. 23-30.

Contributor. Hazleton Laboratories, Vienna, Virginia.

Slide 36

History. Tissue biopsy from a 3-year-old German shepherd cross. The animal had alopecia over the ears, back, abdomen and legs.

Diagnosis. Hyperkeratosis, follicular hyperkeratosis and adnexal atrophy, diffuse, moderate, skin, German shepherd, canine; probable etiology--hypothyroidism.

Comment. While the diagnosis of pituitary dwarfism is essentially a clinical one, it should have been included in the differential diagnosis based on the appearance of the skin. Three endocrine conditions are typically characterized by epidermal and adnexal atrophy, hyperkeratosis and follicular keratosis. These are pituitary dwarfism, hypothyroidism and hyperadrenocorticism. Hypothyroidism may show hypermelanism (present in this case) and hypertrophy of the arrector pili muscles (not shown in this case).

Hyperadrenocorticism may show acanthosis or epidermal atrophy, and in about a third of the cases calcinosis cutis may be found. When calcinosis cutis or hypertrophied arrector pili muscles are not present, all three conditions should be mentioned in a differential diagnosis.

This animal weighed 4.4 lb at 3 years of age and still had deciduous teeth as well as epiphyseal lines that were seen on radiography. His pituitary gland, while only slightly enlarged, was almost totally replaced by cystic spaces. Several cysts lined by columnar cells and filled with a colloidlike material were also present within the third ventricle.

Suggested reading. Mueller, G. H., and Kirk, R. W.: Pituitary dwarfism. In Small Animal Dermatology. Philadelphia, W. B. Saunders Co., 1977, chap. 48, pp. 502-506.

Contributor. Division of Laboratory Animal Medicine, University of Rochester, School of Medicine and Dentistry, Rochester, New York.

Slide 37

History. Tissue from a 12-year-old Belgian mare which had an acute onset of swelling of the four limbs and face, dyspnea and a brownish urine. Her temperature was 104° F., and she had manifested signs of an upper respiratory tract infection 10 days prior to presentation.

Diagnoses. Myositis, necrohemorrhagic, acute, diffuse, severe, muscle, Belgian mare, equine; compatible with anaphylactoid purpura--purpura hemorrhagica of the equine. Enteritis, necrohemorrhagic, acute, diffuse, severe, small intestine.

Comment. Gross pathologic findings included extensive subcutaneous edema with hemorrhages, necrosis with hemorrhages in several skeletal muscles, particularly the thigh muscles, a marked edematous thickening of the wall of the stomach, and edematous and hemorrhagic plaques involving all layers of the small intestine and colon.

The hemorrhagic lesions in different tissues were related to a severe necrotizing vasculitis, which was characterized by a fibrinoid necrosis of the vessels with a massive infiltration of neutrophils both in and surrounding the vessel wall. Some of the affected vessels were thrombosed. Cultures and special stains did not reveal any infectious agents.

Suggested reading. Gunson, D. E., and Rooney, J. R.: Anaphylactoid purpura in a horse. Vet. Pathol. 14: 325-331, 1977.

Contributor. Department of Pathology and Microbiology, Faculty of Veterinary Medicine, University of Montreal, St. Hyacinthe, P. Q. Canada.

Slide 38

History. Tissue from multiple firm growths involving the mammary glands of a 30-month-old female domestic short-hair cat. The animal was pregnant at the time of presentation.

Diagnosis. Total fibroadenomatous change, mammary gland, domestic short-hair, feline.

Comment. This condition is seen in young cats and occasionally in pregnant animals. It is probably hormonally induced.

Suggested reading. Allen, H. L.: Feline mammary hypertrophy. Vet. Pathol. 10: 501-508, 1975.

Contributor. Laboratory of Pathology, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pennsylvania.

Slide 39

History. Tissue from a male cynomolgus monkey (Macaca fascicularis) subjected to inhalation exposures of bituminous coal dust. This 6-year-old did not manifest any clinical symptoms.

Diagnoses. Carcinoma (renal), papillary, cystic, kidney, cynomolgus monkey (Macaca fascicularis). Nephritis, chronic, interstitial, mild, kidney. Cysts, tubular, multifocal, kidney. Arteriopathy, segmental, media and intima, larger arteries, kidney.

Comment. Many glomeruli showed a moderate sclerosis. The cause of the arteriopathy is unknown but has been noted and described in macaque monkeys.

Suggested reading. Besch, J. E., Blair, A. M., Cox, J. E., and Dixon, F. J.: An unusual form of proliferative arteriopathy in macaque monkeys (Macaca sp.). Exp. Mol. Pathol. 21: 322-338, 1975.

Contributor. Pathology Section, Biomedical & Behavioral Sciences Division, National Institute of Occupational Safety & Health, Cincinnati, Ohio.

Slide 40

History. Tissue from a 7-year-old female German short-haired pointer. The animal was treated symptomatically for weight loss and lethargy. She was admitted 3 months later with an enlarged abdomen and a leukocyte count of circulating blood of 32,000/mm^3. Her appetite remained good. One quart of fetid, blood-tinged fluid was removed from the abdominal cavity and was found to contain many polymorphonuclear leukocytes. The animal died the following day. At necropsy, a severe diffuse granulomatous peritonitis with intense hyperemia of all abdominal visceral surfaces was noted.

Diagnosis. Peritonitis, pyogranulomatous with neovascularity, diffuse, severe, peritoneum, German shorthaired pointer, canine; etiology--Actinomyces sp.

Comment. Nocardia sp. and Actinobacillus sp. as well as Actinomyces sp. should have been considered in the differential etiology of this lesion.

Contributor. USDA/ARS, National Animal Disease Laboratory, Ames, Iowa.

Slide 41

History. Tissue from a 7-year-old male guinea pig with a 6-month history of progressive debilitation, inability to use hind legs and convulsions.

Diagnosis. Osteoarthritis, chronic, moderate to severe, stifle joint, guinea pig.

Comment. The apparent inability to use the hind legs is thought to be due to the osteoarthritis rather than a neurologic defect. The term osteoarthropathy may be used in place of osteoarthritis as the inflammatory component was minimal.

Contributor. Tumor Pathology Section, National Cancer Institute, National Institutes of Health, Bethesda, Maryland.

Slide 42

History. Tissue from a "long-haired" gelding pony, approximately 20 to 30 years old, with a 3-year history of a long-hair coat the year round. The animal exhibited polydipsia. A CBC resulted in the following values: WBC=6,700; PCV=57%; Differential=49% neutrophils, 36% lymphocytes, 12% eosinophils, 1% juvenile.

Diagnosis. Adenoma, or hyperplasia, pars intermedia, pituitary, equine.

Comment. Proliferation of cells in the pars intermedia with some compression of the adjacent tissue and mild tinctorial changes were seen in most slides. Distinctively nodular growth with more distinct demarcation or encapsulation, which would be more convincing, was not seen.

Grossly, the pituitary measured 2.0 x 1.5 x 1.5 cm. Adrenal hyperplasia was noted as well as an elevated blood glucose. These gross and microscopic changes are suggestive of a pituitary adenoma.

Contributor. C. E. Kord Animal Disease Diagnostic Laboratory, P. O. Box 40627, Nashville, Tennessee.

Slide 43

History. Tissue from a 2-year-old castrated male domestic short-haired cat which had been having seizures for 8 months. Treatment consisted of phenobarbital and Felowlte. Two months later the cat was presented with recurrent seizures, and at that time it circled to the left.

Diagnosis. Infarct, focal, mild to moderate, cerebrum, feline; compatible with feline ischemic encephalopathy.

Comment. CBC and SMA 12/60 were within normal ranges. The animal tested negative for feline leukemia virus and toxoplasmosis. Cerebrospinal fluid tap was unremarkable. Microscopically, the degeneration and necrosis of neurons, focal infarction with presence of hemosiderin-laden macrophages and astrogliosis with the presence of gemistocytic astrocytes are characteristic of vascular occlusion, although the exact etiology is unknown. Lesions with this entity are usually unilateral in the area of the middle cerebral artery.

Contributor. The Animal Medical Center, 510 East 62nd Street, New York, New York.

Slide 44

History. Tissue from a 312-day-old female (C57BL/6 x BALB/c) F_1 mouse that weighed 23.9 g and appeared clinically normal.

Diagnoses. Carcinoma, hepatocellular, liver, mouse. Carcinoma, hepatocellular, metastatic to lung. Edema, pulmonary with congestion of blood vessels, diffuse, mild, lung. Thrombi, multiple, blood vessels, lung.

Comment. The ability of spontaneous hepatic neoplasms to metastasize has been confirmed by many. However, the frequency of metastasis is usually low. The incidence of hepatic neoplasm varies, though is usually low in a number of inbred strains of mice. Strain C57BL has a low incidence, while strains CBA and C3H are high tumor strains.

Contributor. National Center for Toxicological Research, Jefferson, Arkansas.

Slide 45

History. Tissue from a 3-1/2-year-old male mixed-breed dog with a 2-year history of seizure disorder.

Diagnosis. Encephalitis, granulomatous, multifocal, moderate to severe, cerebrum, brain, mixed-breed, canine; etiology—infestation with Cysticercus cellulosa.

Comment. CBC, MBC, and SMA 12/60 were normal. Although not present on all slides, many slides contained sections of disintegrated cysticerci in the cysts surrounded by granulomatous tissue in the cerebral parenchyma. Some sections with an invaginated scolex showing suckers and a rostellum of hooklets were identified as Cysticercus cellulosa, i.e. the larval form of Taenia solium.

Contributor. The Animal Medical Center, 510 East 62nd Street, New York, New York.

Slide 46

History. Tissue from an 8-year-old intact male horse that was submitted for preputial edema. Peritoneal paracentesis revealed a few inflammatory cells in an abundant ascitic fluid.

Diagnosis. Carcinoma, squamous cell, equine; probable origin—stomach.

Comment. The role of Gastrophilus sp. larvae in the development of gastric squamous cell carcinoma has long been suggested but remains unproven. Histological diagnosis poses no problem, and metastasis has not been recorded outside the peritoneum.

Contributor. Louisiana State University, School of Veterinary Medicine, Baton Rouge, Louisiana.

Slide 47

History. Tissue from a 9-year-old Arabian mare that presented to the University of Georgia Equine Clinic with a history of a bloody mucopurulent nasal discharge, dyspnea and weight loss of 7 to 8 months' duration. These conditions had not responded to antibiotic and antihistamine therapy. Physical examination revealed an inoperable bilateral mass that partially occluded the nasal passages.

Diagnosis. Rhinitis, eosinophilic, granulomatous, diffuse, moderate, vestibule, nares, Arabian, equine; probable etiology—Entomophthora coronata.

Comments. A phycomycotic rhinitis or a maduromycotic mycetoma should be considered in a differential diagnosis. The organisms appear "individualized," which is most compatible with E. coronata. Larger colonies would suggest the etiology to be Mucor sp.

Contributor. University of Georgia, College of Veterinary Medicine, Department of Pathology, Athens, Georgia.

Slide 48

History. Tissue from a 10-week-old feeder pig purchased 2 weeks prior to its death. The animal was reported to have had convulsions.

Diagnoses. Meningoencephalitis, suppurative, diffuse, severe, cerebrum, brain, swine; etiology--Hemophilus sp. Pleuropneumonia, fibrinopurulent, diffuse, moderate, lung. Epicarditis, granulomatous, diffuse, moderate, heart.

Comments. Hemophilus sp. was isolated from the lung, the pericardial fluid and the peritoneal fluid from this pig. Biochemical examination was not carried out to differentiate between the two major groups of porcine Hemophilus sp.--H. suis-parasuis and H. parahemolyticus-pleuropneumonia. These agents produce septicemia, polyserositis, arthritis and meningitis in swine.

Contributor. Kentucky Department of Agriculture Diagnostic Laboratory, North Drive, Hopkinsville, Kentucky.

Slide 49

History. Tissue from an adult male Sprague-Dawley rat with no abnormal clinical signs or laboratory data.

Diagnosis. Degeneration, retinal, segmental, severe, eye. Sprague-Dawley rat; compatible with "light-induced" lesions.

Comment. Retinal dystrophy should be considered within a differential diagnosis; however, it usually occurs in rats 12 to 14 weeks of age. The lesion on this slide is typical of retinal degeneration caused by excessive exposure to incandescent or fluorescent light. The lesion is characterized by

disappearance of cells from the outer nuclear area and thinning of the outer plexiform and photoreceptor layers. This change has been reported in other animals including man, monkeys and pigeons. The animal in this case was from a control group.

Suggested reading. Saunders, L. Z., and Rubin, L. F.: Ophthalmic Pathology of Animals. New York, S. Karger, 1975, pp. 128-129.

Contributor. Department of Pathology, Syntex Research, Palo Alto, California.

Slide 50

History. Tissue from a 1-year-old pigeon that was put to death because of anorexia. At gross necropsy, necrosis of the esophagus and intestine was noted. Of 14 birds, 3 had died in previous days.

Diagnosis. Necrosis, multifocal, mild to moderate, liver, pigeon; etiology--herpesvirus.

Comment. The presence of both large basophilic and eosinophilic intranuclear inclusion bodies suggests a viral origin compatible with a herpesvirus infection (intranuclear inclusion disease of pigeons). Herpesvirus infection of pigeons has been reported from many countries.

Suggested reading. Cornwell, H. J. C., and Wright, N. G.: Herpesvirus infection of pigeons. I. Pathology and virus isolation. J. Comp. Pathol. 80: 221-227, 1970.

Contributor. Animal Pathology Laboratory, Ministry of Agriculture, St. Hyacinthe, Quebec, Canada.

Slide 51

History. Tissue from a 5-week-old turkey poult. This turkey was from a backyard flock that included chickens, ducks, peacocks, guineas and geese. When presented, the turkey had a yellow diarrhea.

Diagnosis. Enterohepatitis, necrotizing, diffuse, severe, cecum and liver, turkey; etiology--Histomonas meleagridis.

Contributor. Kentucky Department of Agriculture, Diagnostic Laboratory, North Drive, Hopkinsville, Kentucky.

Slide 52

History. Tissue from a rock hopper penguin kept in an air-conditioned room. The penguin had intermittent anorexia with occasional vomiting for 1 week prior to death, along with a green diarrhea during its final 24 hours.

Diagnosis. Hepatitis, nonsuppurative, multifocal, moderate, liver, rock hopper penguin; etiology--Plasmodium relictum.

Comments. At gross necropsy, petechiae were on the liver and coronary fat was in the serosa of the small intestine. The liver was streaked with light areas. Parasites were present within the red blood cells and were easily demonstrated on a Giemsa-stained blood smear.

Contributor. Division of Animal Industry, Bureau of Veterinary Laboratory Services, Department of Food & Agriculture, San Gabriel, California.

Slide 53

History. Tissue from a 10-year-old male boxer. The tissue formed a firm nodular mass (5 cm x 2 cm) within the pancreas. The dog had been weak and having convulsions for 8 months.

Diagnosis. Islet cell tumor, pancreas, boxer, canine.

Comment. Blood glucose levels were 30 mg/100 ml during seizures and 60 to 70 mg/100 ml following treatment, which consisted of frequent small meals and oral dextrose at times of hypoglycemic crises.

Contributor. Department of Pathobiology, College of Veterinary Medicine, University of Tennessee, Knoxville, Tennessee.

Slide 54

History. Tissue from an equine fetus aborted at 9-1/2 months gestation.

Diagnosis. Necrosis, multifocal, moderate, thymus, equine; etiology--equine herpesvirus, Type I (equine rhinopneumonitis virus).

Comment. The effect herpesvirus has on cytoplasm was observed in a tissue culture from the lung of this fetus. The thymus is one of the many organs completely involved in herpesvirus infection of the equine fetus. Disorganization of the epithelial matrix precedes medullary edema and necrosis. This, together with depletion of lymphocytes, causes the corticomedullary pattern to be lost. The number of reticular cells with inclusion bodies varies from case to case and can be large, as in this specimen.

Contributor. University of Pennsylvania, New Bolton Center, Kennett Square, R. D. 1, Pennsylvania.

Slide 55

History. Tissue from a 5-year-old goat. The animal had been wormed 2 days prior to developing ataxia and circling. There was no silage in the feed. No treatment was attempted.

Diagnosis. Meningoencephalitis, pyogranulomatous, diffuse, mild, brain stem, goat, caprine; etiology--Listeria sp.

Comment. The only gross lesion consisted of a fibrinous exudate in the right eye. There are typical lesions in the brain stem and an absence of lesions in other portions of the brain. Gram's stain (Brown-Hopps) demonstrated gram-positive rods in some microabscesses. Listeria were cultured from the brain stem after 2 weeks of cold enrichment (4°C). The presence of lesions within the meninges as well as actual microabscess formation varied from slide to slide.

Contributor. Division of Zoonotic Diseases, Armed Forces Institute of Pathology, Washington, D. C.

Slide 56

History. Tissue from a feral sea otter which was found stranded on the beach near San Diego, California. The animal died, and gross necropsy revealed numerous whitish lesions throughout the lungs, liver and kidneys.

Diagnosis. Pneumonia, necrogranulomatous, diffuse, severe, lung, sea otter (Enhydra lutris); etiology--Coccidioides immitis.

Contributor. Los Angeles County Department of Health, 12824 Horton Avenue, Downey, California.

Slide 57

History. Tissue from a moribund summer flounder, Paralichthys dentatus.

Diagnoses. Necrosis, multifocal, mild, pancreas, flounder, Paralichthys dentatus. Emboli, parasitic, arteries/veins, hepatopancreas; etiology--Cryptobia sp. Cestodiasis, bile duct, hepatopancreas; probably Scolex pleuronectis.

Comment. Gross lesions observed in this fish included dermal ulceration, intestinal prolapse with petechial hemorrhage and necrosis, edema of the stomach wall, pale liver and congested spleen. Focal glomerular lesions caused by fibrin thrombi were present in the kidney. Flagellates were abundant in the subcapsular alveolar connective tissue of the liver (hepatopancreas) and also in the submucosa of the intestine and stomach. Little is known of the relationship between Cryptobia infection and disease in wild fish populations. Some of the observed lesions were compatible with ischemic injury caused by parasitic emboli. An incidental finding in many sections is a cestode in the bile duct.

Contributor. National Marine Fisheries Service, Oxford, Maryland.

Slide 58

History. Tissue from a 3-day-old live calf submitted for necropsy. The calf exhibited signs similar to those exhibited by other calves that died this year and the previous year. The calves were born alive and were apparently healthy but soon became unable to rise or nurse on their own and exhibited extensor spasms, especially when handled. There were no significant macroscopic lesions.

Diagnosis. Edema, gliogenic, diffuse, moderate, cerebellum, Hereford, bovine; compatible with lesions of hereditary neuraxial edema in Hereford calves.

Comment. Hereditary neuraxial edema has been identified as an autosomal recessive trait in the Polled Hereford breed. In this case, the sire had been used in two Polled Hereford herds prior to use in this herd when the trait manifested itself.

Suggested reading. Cordy, D. R., Richards, W. P. C., and Stormont, C.: Hereditary neuraxial edema in Hereford calves. Pathol. Vet. 6: 487-501, 1969.

Contributor. School of Veterinary Medicine, Oregon State University, Corvallis, Oregon.

Slide 59

History. Tissue from a guinea pig weighing 250g, one of a group of 50 purchased under contract from a commercial animal supplier. The animal developed persistent diarrhea soon after arrival and was put to death 5 days later after it failed to gain weight. The colony record showed that five other guinea pigs in the group died during the first few days, each showing signs of severe diarrhea (soiled perineum). At necropsy, the mucosa of the proximal 20 cm of the colon was thickened and congested.

Diagnosis. Colitis, subacute, diffuse, severe, colon, Cavia sp., guinea pig; etiology--coccidia, probably Eimeria caviae.

Comment. Blood drawn from the heart at the time the animal was killed showed essentially normal cell values: WBC count, 7,200 with 20 percent neutrophils, 1 percent bands, 79 percent lymphocytes; RBC count, 3.82 million;

hematocrit, 50 percent; hemoglobin, 14.0 g/100 ml. The urine pH was 5; protein 100 mg/100 ml.; ketones negative, glucose negative. Attempts to isolate bacteria from slightly enlarged mesenteric lymph nodes were unsuccessful. Fecal specimens from this animal and from one of the five that died contained oocysts of E. caviae. The remaining four dead animals were not examined. Randomly selected samples from 10 nondiarrheic guinea pigs in the group were negative for oocysts. Investigations revealed that the animal supplier had well-maintained, coccidiosis-free colonies for the production of guinea pigs for use at institutions specifically requiring coccidiosis-free animals. The supplier also produced guinea pigs at another location; these guinea pigs were kept in large floor pens where the bedding was seldom changed. It is suspected that animals from this dirty colony were sporadically used to "fill out" orders when guinea pigs from the clean colony were in short supply.

Contributor. Comparative Pathology Section, Veterinary Resources Branch, DRS, NIH, Bethesda, Maryland.

Slide 60

History. Tissue from one of three racing pigeons with similar lesions. These 3 pigeons were submitted, along with a fourth, from a pen of 30 pigeons that was maintained on a premise with 100 other pens. The birds in the pen from which this bird was taken were reported to have signs of respiratory distress.

Diagnosis. Nematodiasis, proventriculus, pigeon; probably Tetrameres americana.

Contributor. Division of Animal Industry, Bureau of Veterinary Laboratory Services, Department of Food & Agriculture, San Gabriel, California.

Slide 61

History. Tissue from a nude mouse which died without clinical signs of illness. Necropsy revealed lesions that were confined to the liver and consisted of irregular hemorrhagic areas present on both the serosal and cut surfaces.

Diagnosis. Hepatitis, chronic-active, diffuse, moderate with hepatomegalocytosis, liver, nude mouse; etiology--probably mouse hepatitis virus.

Comment. Viral isolation was not done; however, the lesions of necrosis, giant cell formation and regenerative hyperplasia by the hepatocytes were consistent with those described in other outbreaks of MHV-2 infections in nude mice.

Suggested reading. Tamura, T., Ueda, K., Hirano, N., and Fujiwara, K.: Response of nude mice to a mouse hepatitis virus isolated from a wasting nude mouse. Jpn. J. Exp. Med. 46: 19-30, 1976.

Contributor. Department of Comparative Medicine, The Milton S. Hershey Medical Center, Penn State University, Hershey, Pennsylvania.

Slide 62

History. Tissue from a tiger which became weak and anorectic. Treatment included broad spectrum antibiotics, steroids and intravenous fluids. Incoordination became progressively more severe, and death occurred 3 weeks later.

Diagnosis. Meningoencephalitis, pyogranulomatous, diffuse, severe, cerebrum, tiger, etiology--Blastomyces dermatitidis.

Comment. Pyogranulomatous lesions similar to those in the brain were present in the lung, spleen, kidney and spinal cord. Numerous Blastomyces organisms were present in all lesions. Blastomycosis is rare in felines.

Contributor. Department of Veterinary Pathobiology, The Ohio State University, Columbus, Ohio.

Slide 63

History. Tissue from a dog with posterior ataxia for 9 months. There was also a proprioceptive deficit of the hind limbs. A lump was noted in the perianal area.

Diagnosis. Adenocarcinoma, apocrine anal glands, breed not stated, canine.

Comment. This animal had a slight neutrophilia and monocytosis. Serum calcium level was 14.3 mg/dl. Alkaline phosphatase was 223 IU/l. Serum phosphorus was 2.6 mg/dl. Radiographs revealed a soft tissue mass in the sublumbar region. Serum calcium levels dropped to within the normal range after resection of the tumor and metastasis. The gait improved to that expected of an aged, dysplastic dog. The serum calcium level has remained normal for 3 months postoperatively. The dog is on chemotherapy. We concluded that this was a tumor which secreted a parahormonelike substance.

Contributor. Department of Veterinary Pathobiology, The Ohio State University, Columbus, Ohio.

Slide 64

History. Tissue from the left femur of an albino bullfrog (Rana catesbiana) captured as a tadpole in Maryland in June of 1976. It transformed in August and lived well, feeding on crickets, until January 1977. It then developed a "muscular problem" and stopped feeding. It died 2 weeks after the onset of signs of illness.

Diagnoses. Proliferation, nodular, cartilaginous with foci of degeneration, bone Rana catesbiana, bullfrog. Fibroplasia with osteoid formation suggestive of healing fractures, bone.

Comment. The changes seen are compatible with fibrous osteodystrophy of nutritional origin with pathological fractures. Grossly, most bones were soft and misshapen. The bones were subsequently shown to be mostly cartilaginous rather than osseous in nature. This is the first example of this condition we have encountered in Amphibia. Cases in reptiles are not uncommon.

Contributor. Department of Pathology, The Johns Hopkins Hospital, Baltimore, Maryland.

Slide 65

History. Tissue from a giant grouper, Epinephelus itajara (Lichtenstein). This fish weighed approximately 118 kg and had been maintained in an exhibition tank at Marineland in Florida for about 30 years. For the past 8 years it had been used in an immunologic research project

which required that the animal be caught and anesthetized at intervals for sampling. Anesthesia was accomplished by squirting MS-222 over its gills. On the evening before its death, the fish was routinely processed; however, instead of a 10 to 15 minute recovery period from the anesthetic, it was approximately two hours before the fish could be returned to its tank. It was found dead 4 hours later.

Diagnosis. Mesothelioma, heart, giant grouper (Epinephelus itajara [Lichtenstein]).

Comment. A hemangiosarcoma was considered within a differential diagnosis; however, because of a lack of blood within the spaces present and the broad attachment of some of the cuboidal neoplastic cells to each other mesothelioma was the diagnosis most compatible with the lesions seen.

Contributor. Department of Pathology, University of Florida, Gainesville, Florida.

Slide 66

History. Tissue from one of a large number of knots (Calidris canutus) which were found on a beach near John's Pass, St. Petersburg, Florida. Once during each of the previous 4 years, the birds had been found sick or dead in this area. The sick birds were unable to fly; some could not walk or stand. They had a greenish-white feces which matted feathers and occluded the cloaca. The group of birds from which these specimens were taken recovered after 3 days of supportive therapy.

Diagnoses. Endarteritis, proliferative, diffuse, moderate, aorta and muscular arteries of the pancreas, small intestine, and kidney, knot (Calidris canutus); etiology--a protozoan organism compatible with a Besnoitia-like organism. Protozoiasis, endothelium, lamina propria, small intestine; compatible with a Besnoitia-like organism. Protozoiasis, tubular endothelium and urothelium of the renal pelvis, kidney; compatible with a Besnoita-like organism. Trematodiasis and nematodiasis, small intestine.

Comment. The lesions in these birds were similar to those previously described except organisms were noted within aneurysms of the intestinal wall. Infarction was not seen. Various stages of organisms are noted in the kidney. Of particular interest are the macrogametocytes and microgametocytes within the epithelium of the urinary pelvis and cloaca.

Suggested reading list.

Simpson, C. F., Woodard, J. C., and Forrester, D. J.: An epizootic among knots (Calidris canutus) in Florida. II. Ultrastructure of the causative agent, a Besnoitia-like organism. Vet. Pathol. 14: 351-360, 1977.

Woodard, J. C., Forrester, D. J., White, F. H., Gaskin, J. M., and Thompson, N. P.: An epizootic among knots (Calidris canutus) in Florida. I. Disease syndrome, histology and transmission studies. Vet. Pathol. 14: 338-350, 1977.

Contributor. Department of Pathology, University of Florida, Gainesville, Florida.

Slide 67

History. Tissue from a 1-year-old male Husky collie. This animal was first presented for a partial prolapse of the left third eyelid which did not respond to a variety of topical ophthalmic ointments. On day 20 post presentation, the left mandibular lymph nodes enlarged 4 to 5 times their normal size almost overnight. The animal did not respond to systemic antibiotic therapy, became weak and anorectic, and died on day 30.

Diagnosis. Lymphosarcoma, prolymphocytic type, myocardium, heart, Husky collie mix, canine.

Comment. A reticulum cell sarcoma was considered within the differential diagnosis by some attendees. Exact classification of cell type within a lymphosarcoma based on examination of formalin-fixed tissue section is considered arbitrary in the experience of most attendees.

Contributor. Pfizer Central Research, Pathology Laboratory, Groton, Connecticut.

Slide 68

History. Tissue from a male, castrated, DSH, adult feline with anorexia. Exploratory laparotomy revealed a dilated, obstructed section of small intestine which was resected; a tentative diagnosis of foreign body obstruction was rendered by the referring veterinarian. One week later, re-exploration revealed this mass which grossly appeared to be a tumor. No neoplastic cells were seen on impression smears.

Diagnoses. Enteritis, chronic-active, diffuse, moderate to severe, small intestine, domestic short-hair, feline. Globule leukocyte tumor, muscular layers, small intestine.

Comment. The cytoplasm of tumor cells was PAS positive and toluidine blue negative.

Suggested reading. Flinn, J. P., and Schwartz, L. W.: A neoplasm of globule leukocytes in the intestine of a cat. J. Comp. Pathol. 82: 325-326, 1972.

Contributor. Department of Pathology, School of Veterinary Medicine, University of California, Davis, California.

Slide 69

History. Tissue from a 10-year-old castrated male domestic long-hair feline. This animal was first presented because it had been vomiting. A mass was discovered in the liver and was surgically removed from the edge of the left lobe. The mass was firm, white, nonencapsulated and measured 1 x 1 x 1 cm.

Diagnoses. Intrahepatic bile duct cystadenoma, liver, domestic long-hair, feline. Cholangitis, subacute, multifocal, mild, liver.

Comment. Consideration should be given to the possibility of this lesion being either a true neoplasm or an anomaly of bile ducts. The presence of occasional mitotic figures and the age of the animal favors a benign neoplasm. Through the application of special stains, the golden-brown pigment

within both macrophages and the cytoplasm of hepatocytes was confirmed to be iron positive (hemosiderin).

Contributor. Letterman Army Institute of Research, Presidio of San Francisco, California.

Slide 70

History. Tissue from a dolphin. This mature female Pacific white-striped dolphin (Lagenorhynchus obliquidens) measuring 176.0 cm in length was found stranded on a beach in Los Angeles County, California. The interval since death was estimated at 3 hours.

Diagnosis. Meningoencephalitis, granulomatous, focal, extensive, moderate, cerebrum, Pacific white-striped dolphin, (Lagenorhynchus obliquidens); etiology--Nasitrema sp.

Comment. Fragmented adult trematodes in tissue section may sometimes be identified through selective staining of the cuticular spines with phosphotungstic acid hematoxylin (PTAH) stain.

Suggested reading. Parker, G. A., Migaki, G., and Walker, W. A.: Case for diagnosis (on cerebral trematodiasis involving Nasitrema sp.). Milit. Med. 142: 861, 869-870, 1977.

Contributor. Registry of Comparative Pathology, Department of Veterinary Pathology, Armed Forces Institute of Pathology, Washington, D.C.

Slide 71

History. Tissue from a rabbit. This rabbit was received from a supplier for use in a pyrogen test. The animal's head tilted to one side.

Diagnosis. Otitis externa, chronic-active, diffuse, moderate with mild acanthosis and hyperkeratosis, external ear canal, breed not stated, rabbit; etiology--infestation with ear mites, Psoroptes cuniculi.

Comment. P. cunicli can be identified by cup-shaped suckers on segmental stalks.

Contributor. Division of Pathology, Bureau of Biologics, Food & Drug Administration, Bethesda, Maryland.

Slide 72

History. Tissue from a 12-year-old American saddle-horse gelding. The animal had frequent but unsuccessful attempts to urinate. The problem was alleviated by surgical excision of a 0.75 nodule from the penis.

Diagnosis. Balanitis, granulomatous, diffuse, severe, penis, American saddle horse, equine; etiology--probably Habronema sp.

Contributor. University of Alabama, The Medical Center, Birmingham, Alabama.

Slide 73

History. Tissue from a 4-week-old male barrier-maintained MR/N rat that was delivered by cesarean section. The sections presented are from the area of C_3 and T_{13} of the spinal cord. The animal was submitted for necropsy because of sudden bilateral hind-limb paralysis.

Diagnoses. Myelopathy, necrohemorrhagic, subacute, focal, moderate, cervical spinal cord, MR/N rat; etiology--vascular compromise, probably due to trauma. Myelomalacia, dorsal and dorsolateral, diffuse, severe, thoracic spinal cord; etiology--vascular compromise, probably due to trauma.

Comments. Grossly, the hind leg musculature was slightly atrophic and the urinary bladder was markedly distended. The urine was clear yellow. The clinical and pathologic findings suggested the rat suffered from a recent traumatic insult near T_{13} and L_1. Most likely the spinal column was accidentally twisted or hyperextended severely while the rat was being handled. The acute trauma to the cord then initiated a progressive ascending and descending hemorrhagic myelomalacia. This syndrome and the lesions encountered resemble spinal cord trauma in dogs (Griffiths, 1972). The pathogenesis of the progressive malacic lesions seems to be a result of profound local hypoxia. Direct vascular injury and toxic neurotransmitter-vascular reactions have been proposed by Osterhold (1974) as explanations for traumatic microcirculatory arrest.

Suggested reading list.

Griffiths, I. R.: Some aspects of the pathology and pathogenesis of the myelopathy caused by disc protrusions in the dog. J. Neurol. Neurosurg. Psychiatry 35: 403-413, 1972.

Osterhold, J. L. The pathophysiological response to spinal cord injury. J. Neurosurg. 40: 5-33, 1974.

Contributor. Comparative Pathology Section, Veterinary Resources Branch, DRS, NIH, Bethesda, Maryland.

Slide 74

History. Tissue from a 2-year-old male king cobra. This snake was eating snakes, had ataxia, and assumed strange positions. The snake's appetite remained unchanged.

Diagnosis. Enteritis, necrotic, chronic, segmental, severe, probably colon, king cobra (Ophiophagus hannah); etiology-- amoeba, probably Entamoeba invadens.

Contributor. School of Veterinary Medicine, Louisiana State University, Baton Rouge, Louisiana.

Slide 75

History. Tissue from an 11-week-old orphan male lesser panda (Ailurus fulgens) which died after an attempt to hand-rear failed. The skin over the neck and chest had diffuse areas of alopecia and contained a moist exudate.

Diagnosis. Dermatitis, perifollicular and follicular, chronic-active, diffuse, moderate, skin, lesser panda (Ailurus fulgens); etiology-- dermatophytic fungi, probably Trichophyton sp. or Microsporum sp.

Comments. The panda cub died of aspiration pneumonia due to mild engorgement. The skin lesions appeared to be incidental, possibly associated with neonatal stress. Cultures of the skin were negative for bacteria but contained sterile hyphae which could not be identified. In the histologic section, many of the hair shafts contained septate hyphae and arthrospores compatible with a ringworm-producing dermatomycete. There is hyperkeratosis and acanthosis accompanied by suppurative folliculitis with microabscess formation in the dermis. There were no bacteria evident in the Gram stains. This extensive attendant inflammation, although not a usual finding in ringworm lesions, occurs with some species of Trichophyton.

Contributor. National Zoological Park, Office of Pathology, Washington, D.C.

Slide 76

History. Tissue from an adult female parakeet (Melopsittacus undulatus) which was presented with a "lameness" in the leg that progressed to paralysis over a 2-month period. An abdominal enlargement was also noted at that time.

Diagnosis. Embryonal nephroma, kidney, parakeet (Melopsittacus undulatus).

Comment. Renal carcinomas are not uncommon in budgerigars (parakeets), which often present with paresis of one leg caused by involvement of the sciatic nerve with tumor. There may be progression to bilateral paralysis

with attendant abdominal distention, dyspnea, lethargy and weight loss. Two types of tumors have been described—an adenocarcinoma arising from renal tubules and an embryonal nephroma, some features of which are demonstrated in this tumor.

Suggested reading. Helmboldt, C. F., and Jortner, B. S.: Histologic patterns of the avian embryonal nephroma. Avian Dis. 10: 452-462, 1966.

Contributor. National Zoological Park, Office of Pathology, Washington, D.C.

Slide 77

History. Tissue from a 5-year-old female Simmental-Hereford cross that presented with severe respiratory distress. At necropsy, a large amount of transudate was noted in the pleural cavity.

Diagnosis. Adenocarcinoma, sclerosing, lung, Simmental-Hereford cross, bovine.

Comment. The distribution of tumor masses within the lung was characteristic of a metastatic pattern. The glandular pattern is maintained in this tumor. The abundance of fibrous connective tissue coupled with the presence of masses of cellular, often necrotic debris, within the glandular structures is characteristic of an adenocarcinoma of the uterus of the cow. Metastases may be found in the internal iliac and lumbar nodes in 85 percent of the cases; in the lungs in 85 percent; in the mediastinal and bronchial lymph nodes in 68 percent; in the liver, kidney and heart in 19 percent; and in the peritoneum in 10 percent of the cases.

Suggested reading. Migaki, G., Carey, A. M., Turnquest, R. U., and Garner, F. M.: Pathology of bovine uterine adenocarcinoma. J. Am. Vet. Med. Assoc. 157: 1577-1584, 1970.

Contributor. Montana State Diagnostic Laboratory, Bozeman, Montana.

Slide 78

History. Tissue from a 3-year-old male German shepherd. The dog had a history of "falling over" and emesis during the night prior to being seen by the referring veterinarian. Intoxication was suspected, and home observation was recommended. One day later the dog was admitted to an emergency clinic with marked ataxia, constricted nonresponsive pupils, emesis, convulsions and hyperventilation. Intravenous diazepam and atropine were only moderately effective at high doses. Very little urine was produced after institution of fluid therapy or after intravenous mannitol and dexamethasone therapy. A pneumocystogram was negative.

Diagnosis. Nephrosis, tubular, toxic, diffuse, moderate, kidney, German shepherd, canine; etiology—oxalate crystals compatible with ethylene glycol.

Contributor. Experimental Pathology Laboratories, Inc., Herndon, Virginia.

Slide 79

History. Tissue from a cow which was sick for 4 days before it died. Clinical signs included pyrexia, hemoglobinuria and depression with progressive CNS signs terminating in convulsions prior to death.

Diagnoses. Congestion, diffuse, mild, capillaries, cerebrum, brain, breed not stated, bovine; red blood cells are infected with Babesia sp., probably B. bovis (argentina). Nephrosis, multifocal, moderate, tubules, kidney; etiology--hemoglobin.

Comment. Cerebral capillaries are packed with parasitized erythrocytes. Hyaline hemoglobin casts distend tubules, and there is pigmentation and degeneration of tubular epithelium. Cerebral babesiosis, characterized by sequestration of a large number of parasitized erythrocytes in cerebral vessels, is caused only by the small Babesia species, i.e. B. bovis (argentina) and B. berbera, and not by B. bigemina. Postmortem findings were typical of babesiosis and included jaundice, enlarged liver with granular bile, enlarged spleen and congested kidneys with red urine.

Contributor. Regional Veterinary Laboratory, Department of Agriculture, Wollongbar, N. S. W. Australia.

Slide 80

History. Tissue from the lower left lip of an 11-year-old beagle dog. The dog was presented with a red enlarged lesion measuring 1.0 x 1.0 x 0.8 cm.

Diagnosis. Cutaneous lymphosarcoma, skin, beagle, canine.

Comment. Consideration was given to this being a histiocytoma or a lymphosarcoma. While mitotic figures may be seen in either tumor, histiocytomas are usually seen in younger animals and regressive changes are often present. The age of this animal, the presence of mitotic figures, and

the lack of regressive changes make this tumor more compatible with a cutaneous lymphosarcoma.

At the time of this animal's death, 1 year after the biopsy specimen was presented here, gross necropsy revealed metastasis to the pharyngeal lymph nodes. Another cutaneous mass was noted dorsal to the rectum. Impression smears of the perirectal mass indicate the cells to be compatible with histiocytic lymphocytes.

Suggested reading Nesbitt, G. H., and Dickinson, E. O.: Primary cutaneous lymphosarcoma in a dog: A case report. J. Am. Anim. Hosp. Assoc. 13: 716-719, 1977.

Contributor. Lovelace Foundation, Albuquerque, New Mexico.

Slide 81

History. Tissue from an experimentally infected adult female dog. This mixed breed was given a protozoan parasite. She died suddenly without prior clinical signs 44 days postinfection.

Diagnosis. Myocarditis, granulomatous, diffuse, moderate, heart, mixed breed, canine; etiology--Trypanosoma cruzi.

Comment. In tissue sections, T. cruzi may be differentiated from Toxoplasma sp. as the latter do not have kinetoplasts. The kinetoplast of T. cruzi is larger than the kinetoplast of Leishmania sp. Furthermore, leishmania tend to concentrate in the reticuloendothelial system, an uncommon site for T. cruzi.

Suggested reading. Williams, G. D., Adams, L. G., Yaeger, R. G., McGrath, R. K., Read, M. K., and Bilderback, W. R.: Naturally occurring tryparosomiasis (Chagas' Disease) in dogs. J. Am. Vet. Med. Assoc. 171: 171-177, 1977.

Contributor. University of Georgia, Department of Veterinary Pathology and Parasitology, Athens, Georgia.

Slide 82

History. Tissue from a cynomolgus monkey, one of 35 with similar histologic lesions from a group of 75 monkeys. This animal was used in a chronic inhalation study. The only gross abnormality noted at necropsy was a slight granular appearance and/or congestion of the nasal mucosa in some of the monkeys.

Diagnoses. Rhinitis, granulomatous, eosinophilic, diffuse, moderate, dermis, skin, nasal passage, cynomolgus monkey (Macaca fascicularis); etiology--nematodiasis, compatible with Anatricosoma cynomolgi. Hyperkeratosis, diffuse, mild, epidermis, skin, nasal passage.

Comment. An occasional nematode is noted in the epidermis. This nematode was smaller than those seen in the nasal passage. The larger nematode, located in the nasal passage, is the female Anatrichosoma cynomolgi, while the smaller is the male of the species.

Contributor. Experimental Pathology Laboratories, Inc., Herndon, Virginia.

Slide 83

History. Tissue from a 3-year-old male canine reported to have had diarrhea and a loss in weight for 2 months. Examination revealed generalized peripheral edema, 1 liter of ascites and an elevated temperature of 103.8° F. The diarrhea persisted in spite of antibiotic therapy.

Diagnosis. Lymphangiectasia, intestinal, diffuse, mild, central lacteals, small intestine, breed not stated, canine; etiology--compatible with a protein-losing enteropathy.

Comment.

a. Temperature: Fluctuated between 101.5° and 103.8° F.
(Normal: 101.5° - 102.0° F.)

b. Hemograms--range over 2-week period:

Canine subject	Canine normal
WBC 23,400 - 29,000	6,000 - 18,000
RBC 6.1×10^6 - 6.8×10^6	5.5×10^6 - 8.0×10^6
PCV 42.4% - 46.6%	42.0% - 57.0%
Differential	
Polys 85-90%	59-85%
Stabs 4-11%	0-1%
Lymphs 4-6%	10-30%

c. Blood chemistry--range over 2-week period:

Canine subject	Units	Canine normal
Glucose: 52 - 78	MG/DL	71 - 129
BUN: 8 - 16	MG/DL	5 - 25
Uric Acid: 0.9 - 0.9	MG/DL	0.1 - 1.5

Calcium: 7.6 - 7.8	MG/DL	8.1 - 11.3
Cholesterol: 50 - 65	MG/DL	82 - 287
Total Bilirubin: 1.1 - 0.1	MG/DL	0 - 0.5
Sodium: 130 - 144	MEQ/L	138 - 155
Potassium: 3.7 - 5.8	MEQ/L	3.7 - 5.3
Chloride: 100 - 117	MEQ/L	98 - 113
Total Protein: 3.0 - 3.2	GM/DL	5.3 - 7.7
Albumin: 1.2 - 1.2	GM/DL	2.2 - 3.8
Alkaline Phosphatase: 26 - 46	I.U./L	0 - 40
SGPT: 49 - 52	I.U./L	0 - 63
LDH: 189 - 204	I.U./L	0 - 293

d. Urinalysis:

Protein: 1+ (Normal: Neg)

Glucose: Neg (Normal: Neg)

Ketones: Neg (Normal: Neg)

Specific Gravity: 1.024 Normal: 1.015 - 1.045

pH: 6 (Normal: 6 - 7)

e. Fecal profile:

Parasitic ova: Negative

Moderate Sudan positive for free fat globules

Negative for fatty acid crystals

Negative for muscle fibers

Negative for starch

Positive for Trypsin

The clinical data suggests that the animal's hypoproteinemia was not the result of hepatic or renal disease but was due to a protein-losing enteropathy. Protein loss due to lymphangiectasis apparently occurs because of extravasation of protein-rich lymph into the intestinal tract. Impaired absorption has also been described in human beings with intestinal lymphangectasia.

Suggested reading. Barton, C. L., Smith, C., Troy, G., Hightower, D., and Hood, D.: The diagnosis and clinicopathological features of canine protein-losing enteropathy. J. Am. Anim. Hosp. Assoc. 14: 85-91, 1978.

Contributor. University of Texas Health Science Center, Dallas, Texas.

Slide 84 and 85

History. Tissue from an Angus calf which developed hindlimb incoordination and fine intention tremors of the head at 2 months of age.

Diagnoses. Vacuolation, neuronal with eosinophilic spheroids, cerebellum, brain, Angus, bovine; compatible with mannosidosis of Angus cattle. Vacuolation, exocrine cells, pancreas, compatible with mannosidosis of Angus cattle. Vacuolation, fixed reticuloendothelial cells and free macropheges, medullary sinusoids, lymph node; compatible with mannosidosis of Angus cattle.

Comment. This is an autosomal recessive deficiency of the lysosomal enzyme alpha-mannosidase. The cytoplasm of the neurons is granular, finely vacuolated and swollen. Eosinophilic spheroids are prominent in the white

matter of these sections. There is vacuolation of acinar cells of the pancreas and accumulation of vacuolated macrophages in the medullary sinuses of the lymph node. This is an economically important lysosomal storage disease of domestic animals, restricted to this breed in Australia and New Zealand. Control programs depend on detection of clinically normal heterozygotes by measuring plasma and leukocyte levels of alpha-mannosidase.

Suggested reading. Jolly, R. D., and Thompson, G.: The pathology of bovine mannosidosis. Vet. Pathol. 15: 141-152, 1978.

Contributor. Regional Veterinary Laboratory, Department of Agriculture, Wollongbar, N. S. W., Australia.

Slide 86

History. Tissue from two specimens of blue crab, Callinectes sapidus, collected near Beaufort, North Carolina. The tissues adjacent to the label are from a normal animal. The tissues distal to the label are from a moribund animal.

Diagnosis. Protozoiasis, hemocytes, hemolymph, heart, blue crab, Callinectes sapidus; compatible with Hematodinium sp.

Comment. This parasitic dinoflagellate is found in blue crabs from North Carolina to the Gulf Coast, and in some areas, it has attained a seasonal prevalence of 30 percent. Affected animals are sluggish. Hemolymph withdrawn by syringe will be opalescent, fails to clot, is filled with the parasites and lacks normal formed elements. The organism is occasionally found in other North Atlantic crabs.

Suggested reading. Newman, M. W. and Johnson, C. A.: A disease of blue crabs (Callinectes sapidus) caused by a parasitic dinoflagellate, Hematodinium sp. J. Parasitol. 61: 554-557, 1975.

Contributor. National Marine Fisheries Service, Oxford, Maryland.

Slide 87

History. Tissue from an aged Fischer 344 male rat.

Diagnoses. Interstitial cell tumor, testis, rat. Mesothelioma, tunica vaginalis, testis.

Comment. Chronic prostatitis is also present. Interstitial cell tumors and mesotheliomas are both common lesions in male Fischer rats. In the contributor's material, 2.1 percent of 145 aged male Fischer 344 rats had mesotheliomas and 60 percent had interstitial cell tumors. This particular mesothelioma had numerous peritoneal implants throughout the abdomen.

Contributor. Pathology Branch, Toxic Hazards Division, 6570 Aerospace Medical Research Laboratory, Wright Patterson Air Force Base, Ohio.

Slide 88

History. Tissue from a 2-year-old Saanen doe which had a history of refractory mastitis. She had been treated with various antibiotics both systemically and as udder infusions. Her twin kids refused to nurse. A few days after parturition the udder was normal; then it got hot and hard. Clinically, the animal remained bright and alert.

Diagnosis. Mastitis, pyogranulomatous, diffuse, severe, mammary gland, Saanen doe; etiology--mycotic organism, probably Aspergillus sp.

Comment. Although culture of the organism is the most conclusive method of identification, the presence of dichotomous branching, parallel walls and the large number of organisms visible in H&E stained-tissue were most compatible with Aspergillus sp.

Contributor. British Columbia Veterinary Laboratory, Abbotsford, British Columbia.

Slide 89

History. Tissue from a 3-week-old golden hamster inoculated with serum from a patient who had an acute illness during an epidemic. The hamster died 30 hours postinoculation. The tissue was fixed in Carnoy's fixative.

Diagnosis. Hepatitis, diffuse, moderate to severe, liver, golden hamster; etiology--viral, compatible with Rift Valley Fever.

Comment. This virus was responsible for an epidemic among livestock and humans in Egypt. Patients with acute illness were viremic with an estimated 8 to 10 logs of virus. Mice and hamsters inoculated by any route would die within 30 to 36 hours, if given undiluted human serum. The lesions in this hamster may not be typical of a natural case. Because of the large dose of virus this animal received, it may be assumed that virtually all the hepatocytes were infected at the same time, producing death before extensive focal areas of necrosis occurred.

Contributor. Veterinary Pathology Division, Walter Reed Army Institute of Research, Washington, D. C.

Slide 90

History. Tissue is presented from a cat.

Diagnosis. Pneumonia, granulomatous, focally extensive, severe, lung, breed not stated, feline; etiology--trematodiasis compatible with Paragonimus kellicotti.

Comment. The pulmonary arteries showed varying degrees of intimal and medial hypertrophy, which is often seen with verminous pneumonias but should not be considered pathognomonic for them. A fibrinous pleuritis seen on the surface of some sections of lung varied in degree from slide to slide. Some conference attendees favored a diagnosis of hyperplasia of bronchial glands; however, in the feline, these glands may be quite prominent and may appear to be increased in number by virtue of a tangential cut of tissue. This animal had been fed 20 metacercaria in order to obtain materials for a parasitology course. Pulmonary lesions were observed radiographically about 38 days post exposure, and the animal died about 90 days post exposure. Paragonimus eggs were observed intermittently in the stool from post exposure day 38 until death. Death was due to pyothorax and hemorrhage secondary to rupture of a parasitic abscess.

Contributor. Veterinary Pathology Division, Walter Reed Army Institute of Research, Washington, D. C.

Slide 91

History. Tissue from a 12-year-old German shepherd that was put to death because of debilitating spondylosis. A mass was located in the abdominal cavity adjacent to the posterior vena cava. When seen on cross section, the mass was approximately 4 x 3 x 2 cm, well-encapsulated, firm, and whitish-tan with foci of hemorrhage of various sizes.

Diagnosis. Paraganglioma (chemodectoma), extra-adrenal, German shepherd, canine.

Suggested reading. Patnaik, A. K., Liu, S. K., Hurvitz, A. I., and McClelland, A. J.: Canine chemodectoma (extra-adrenal paragangliomas)--A comparative study. J. Small Anim. Pract. 16: 785-801, 1975.

Contributor. USAF School of Aerospace Medicine(VSP), Brooks Air Force Base, Texas.

Slide 92

History. Tissue from a 6-week-old quarter horse colt which was found comatose 2 hours before death. Mucous membranes were yellow, and the body temperature was 98° F. The tissues were extremely yellow, but the liver appeared normal. The spleen was slightly enlarged.

Diagnosis. Hepatitis, necropurulent, focally disseminated, severe, liver, quarter horse, equine, etiology--Tyzzer's disease caused by Bacillus piliformis.

Suggested reading. Hal, W. C., and Van Kruiningen, H. J.: Tyzzer's disease in a horse. J. Am. Vet. Med. Assoc. 164: 1187-1189, 1974.

Contributor. Animal Disease Diagnostic Laboratory, Purdue University, West Lafayette, Indiana.

Slide 93

History. Tissue from a 1-month-old calf treated for diarrhea. The animal subsequently developed raised, crusty lesions on the skin over 80 to 90 percent of its body.

Diagnosis. Epidermitis, focally extensive, severe, skin, breed not stated, bovine; etiology--probably Dermatophilus congolensis.

Contributor. College of Veterinary Medicine, Oklahoma State University, Stillwater, Oklahoma.

Slide 94

History. Tissue from a 6-month-old female pig that walked in a "goose-stepping" manner for at least 2 months before gradually developing total leg weakness and generalized incoordination. The pig became totally recumbent 2 days prior to death.

Diagnosis. Vacuolar change, diffuse, moderate, neurons, spinal cord, breed not stated, porcine; compatible with GM_2 gangliosidosis.

Suggested reading. Pierce, K. R., Kosanke, S. D., Bay, W. W., and Bridges, C. H.: Porcine cerebrospinal lipodystrophy (GM_2 gangliosidosis). Am. J. Pathol. 83: 419-422, 1976.

Contributor. Department of Veterinary Pathology, College of Veterinary Medicine, Texas A&M University, College Station, Texas.

Slide 95

History. Tissue from a 12-year-old male domestic short-hair cat. The cat was admitted to the hospital with a temperature of 103.6° F. and a history of chronic coughing and shallow respirations. Vomiting and blood in the stool were also observed. A CBC and differential were performed, and x-ray revealed a "snowflake" appearance in the lungs. The animal's condition rapidly deteriorated. Final presenting symptoms were rapid, shallow respirations, vomiting and dark, tarry stools.

Diagnosis. Adenocarcinoma, papillar, lung, domestic short-hair, feline.

Comment. While a bronchiolar-alveolar cell carcinoma should be considered in a differential diagnosis, the presence of acinar areas coupled with the predominantly papillary pattern was most compatible with a diagnosis of papillary adenocarcinoma of the lung.

Contributor. Hazleton Laboratories, Vienna, Virginia.

Slide 96

History. Tissue from an aborted caprine fetus, one of 50 aborted fetuses associated with an acute outbreak when some new goats were introduced into a closed herd.

Diagnoses. Necrosis, multifocal, severe and intranuclear inclusion bodies, hepatocytes, liver, breed not stated, caprine; etiology--probably caprine herpesvirus. Necrosis, patchy, moderate and intranuclear inclusion bodies, epithelial cells, thymus; etiology--probably caprine herpesvirus.

Contributor. Department of Veterinary Pathology, College of Veterinary Medicine, Texas A&M University, College Station, Texas.

Slide 97

History. Tissue from a male C57BL mouse which was the runt of the litter. By 2 weeks of age, focal alopecia was seen on the ears and shoulders. By 4 weeks, the mouse weighed only 12 grams and had dyspnea. He died at 6 weeks of age. At necropsy, the entire lung was consolidated and yellow-orange.

Diagnosis. Pneumonia, granulomatous, focally extensive to diffuse, severe, lung, C57BL mouse; compatible with lungs of motheaten mouse.

Comment. The primary lesion is a macrophage (alveolar) accumulation with intracellular crystal formation. The disease may be a lysosomal defect. The crystals are present in alveolar macrophages, some of which are modified into large multinucleated cells. The crystals are eosinophilic in these sections; however, their color depends on the pH of the eosin stain.

Suggested reading. Wand, J. M.: Pulmonary pathology of the motheaten mouse. Vet. Pathol. 15: 170-178, 1978.

Contributor. National Cancer Institute, National Institutes of Health, Bethesda, Maryland.

Slide 98

History. Tissue from 25 6-week-old pigs out of a group of 100 that showed signs of CNS disease with sudden onset and death in 1 to 2 days. Temperatures were normal. The only gross lesions noted were edema (SQ and conjunctival)

and "milk" spots on the liver. Tylon and sulphamethazine were included in the feed.

Diagnosis. Edema, perivascular, mild, cerebrum, brain, breed not stated, porcine; compatible with lesions of edema disease in swine.

Contributor. Montana State Diagnostic Laboratory, Bozeman, Montana.

Slide 99

History. Tissue from a rat. At necropsy, a mass measuring 1 cm in diameter was present in the subcutaneous tissue.

Diagnosis. Papillary cyst adenoma, mammary gland, Wistar, rat.

Contributor. Pathology Department, Eli Lilly & Company, Greenfield, Indiana.

Slide 100

History. Tissue from a 3-year-old schnauzer. A 2-mm oval, pigmented skin nodule was present on the back of this animal. The animal was in good health, and surgical recovery was uneventful.

Diagnosis. Melanoma, benign, dermis, skin, schnauzer, canine.

Comment. There is no junctional activity, and a melanin-bleached section of tissue shows that mitotic figures are very rare.

Contributor. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois.