



2007

Topics in Laboratory Animal Medicine

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Laboratory Rabbit

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- ❖ All information is deemed reliable and correct
 - ❑ No warranty for accuracy
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Laboratory Rabbit

❖ Taxonomy

- ☐ Kingdom..... Animalia
- ☐ Phylum..... Chordata
- ☐ Class..... Mammalia
- ☐ Order..... Lagomorpha
- ☐ Family..... Leporidae
- ☐ Genera (*European rabbit*)... Oryctolagus
- ☐ Genera (*Hares*)..... Lepus
- ☐ Genera (*Cottontail rabbit*)... Sylvilagus

Laboratory Rabbit

❖ Which describes a rabbit and a hare.

☐ A describes a rabbit and B describes a hare

A.

☐ born naked, blind, helpless, in a fur-lined nest.

☐ "Belgian hare"

☐ longer palate

☐ more than 50 well established breeds

B.

☐ born fully haired, open eyed, and in the open, not in a nest

☐ "Jack rabbit"

❖ What is the etiologic diagnosis?

❖ Pasteurellosis

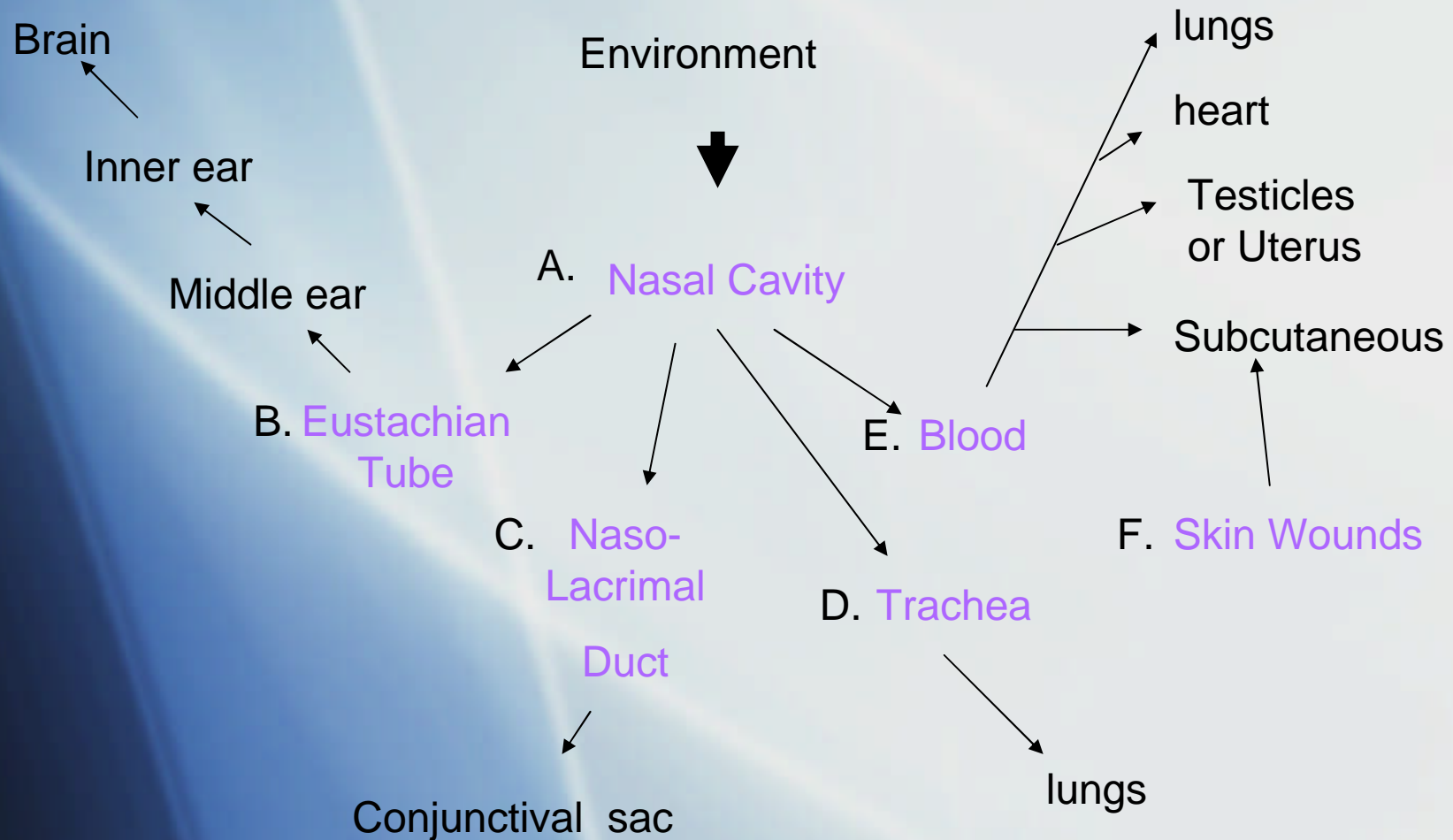
❖ What is the etiologic agent?

❖ *Pasteurella multocida*



Pasteurellosis

❖ Fill in the route of infection



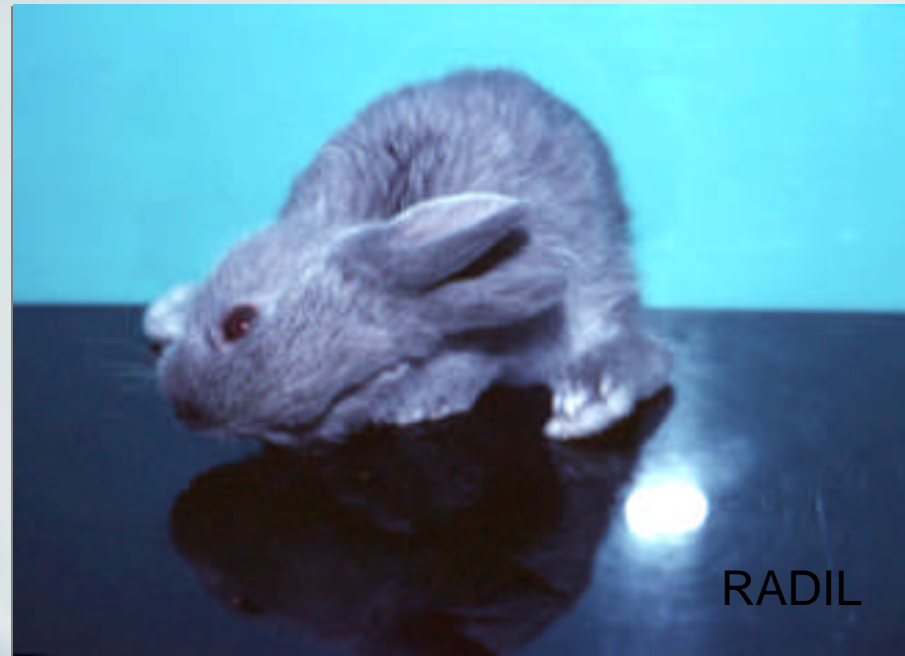
Pasteurellosis

❖ Name the sign.

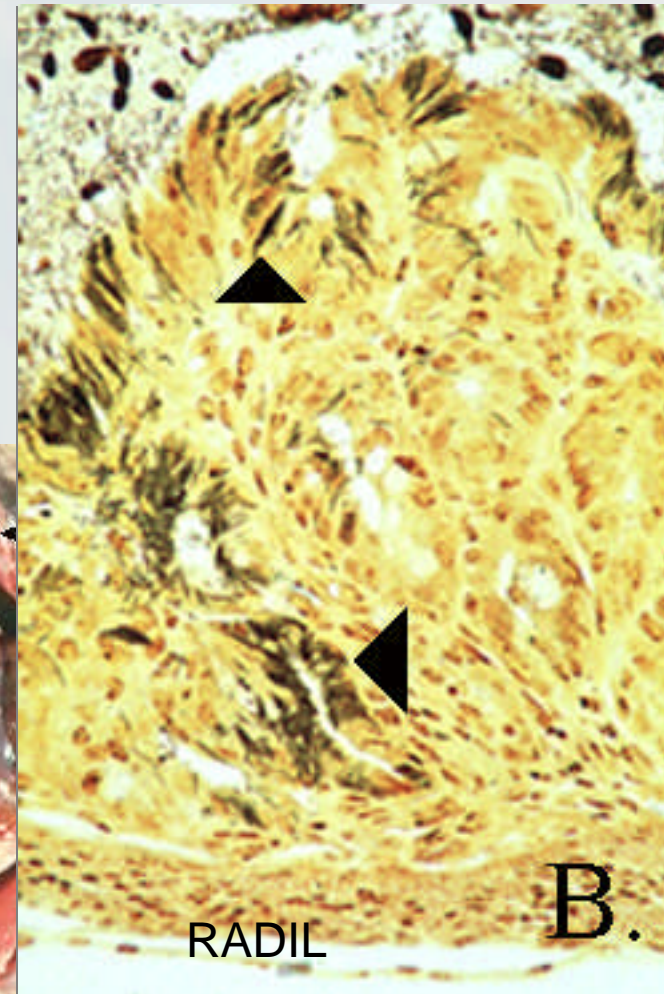
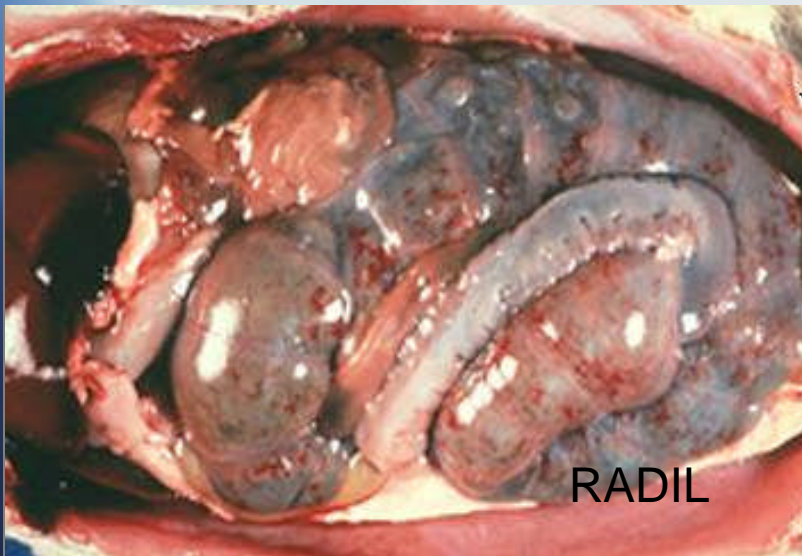
❑ Torticollis (head tilt)

❖ What is the pathogenesis?

❑ Otitis media progressing to otitis interna or meningoencephalitis



- ❖ Name the disease.
 - ❖ Tyzzer's Disease
- ❖ What is the etiologic agent?
 - ❖ *Clostridium piliforme*
- ❖ What are the major organs effected?
 - ❖ gut, liver, and heart



❖ This rabbit was found dead with no prior signs of illness. What is most likely etiologic diagnosis?

❖ Clostridial enterotoxemia

❖ What is the most common etiologic agent?

❖ *Clostridium spiroforme*

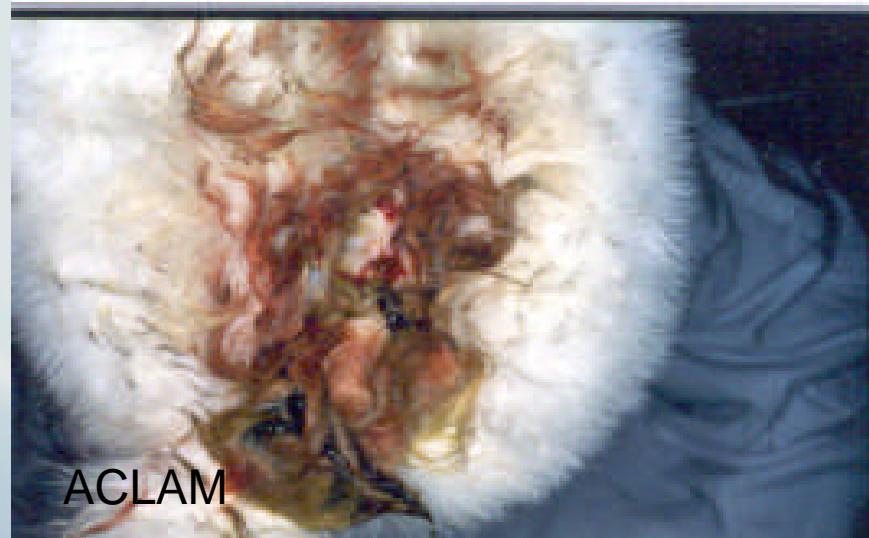
❖ Name 4 predisposing factors.

❖ high grain diet (starch)

❖ low fiber diet

❖ restrict diet during pregnancy then *ad libitum* at kindling

❖ stress



❖ Name the disease?

❖ Muroid Enteropathy

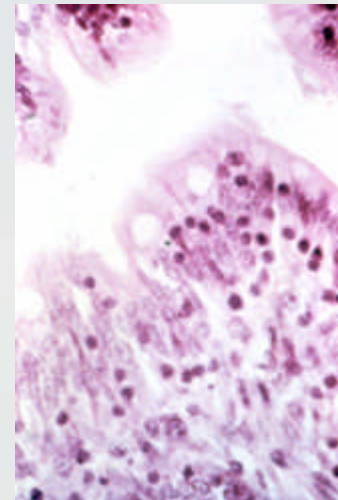
❖ What is the etiology?

❖ Unknown



Mucoid Enteropathy (ME):

- ❖ Synonyms : bloat, mucoid diarrhea, scours, “enteritis”, and “mucoid enteritis”.
- ❖ Both enteritis and mucoid enteritis are incorrect terms based on the pathology of the lesions in which no intestinal inflammation is seen.

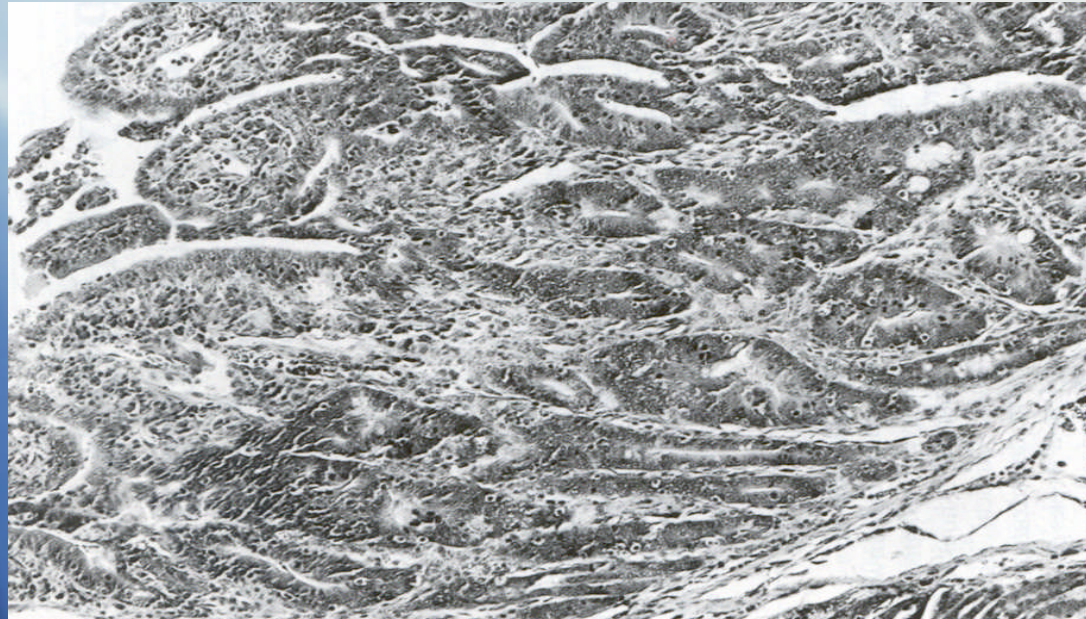


❖ **Name the disease.**

❖ Proliferative Enteropathy

❖ **What is the etiologic agent?**

❖ *Lawsonia intracellularis*



❖ What is the etiologic diagnosis?

❖ Treponematoses or Venereal Spirochetosis

❖ What is the etiologic agent?

❖ *Treponema paraluis cuniculi*

❖ What is the common name for the disease?

❖ Rabbit syphilis



RADIL



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Treponematoses

❖ What test is depicted in this picture?

❖ Darkfield Microscopy

❖ What other tests might be used to diagnosis this agent?

❖ Microhemagglutination Test

❖ Fluorescent Treponemal Antibody-Absorption Test

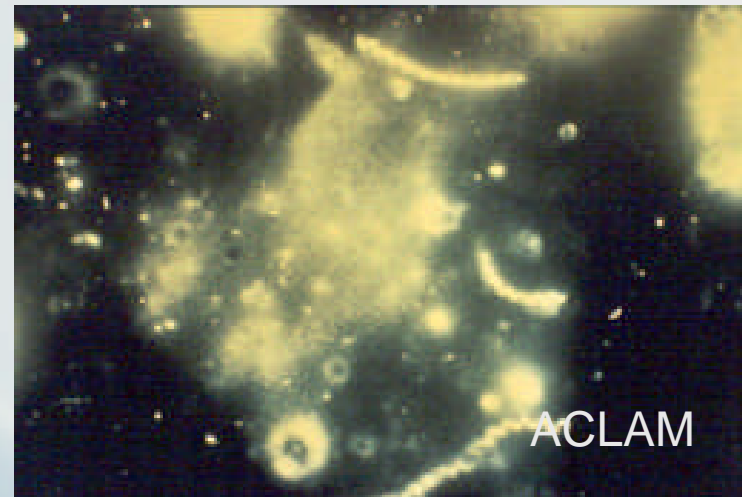
❖ Fluorescent Monoclonal
Antibody Test

❖ Rapid Plasma Reagin Test

❖ Venereal Disease Research
Laboratory (VDRL) Slide Test

❖ VDRL ELISA

❖ Wassermann Test (CF)



❖ What is the etiologic diagnosis?

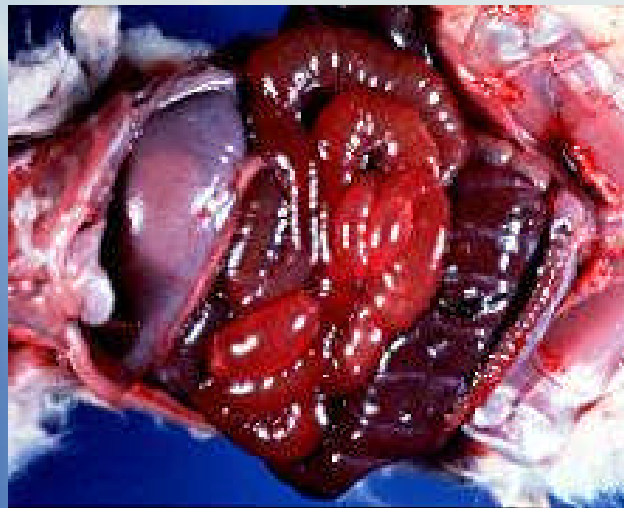
❑ Colibacillosis

❖ What is the etiologic agent?

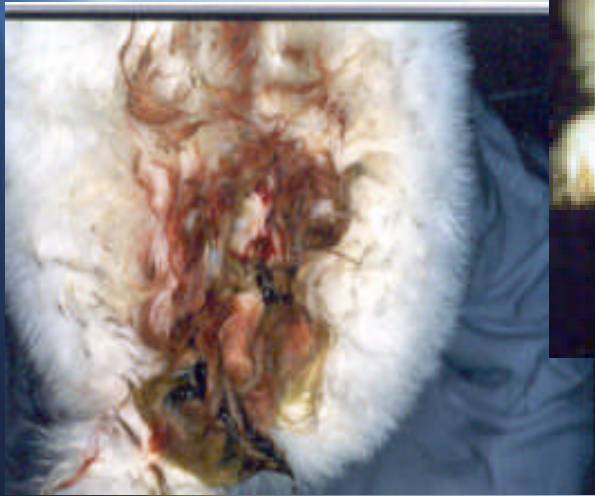
❑ *Escherichia coli*

❖ What age of rabbit is most effected?

❑ _important cause of diarrhea and death in 5-10 week old rabbits with mortality ranges from 20-100%.



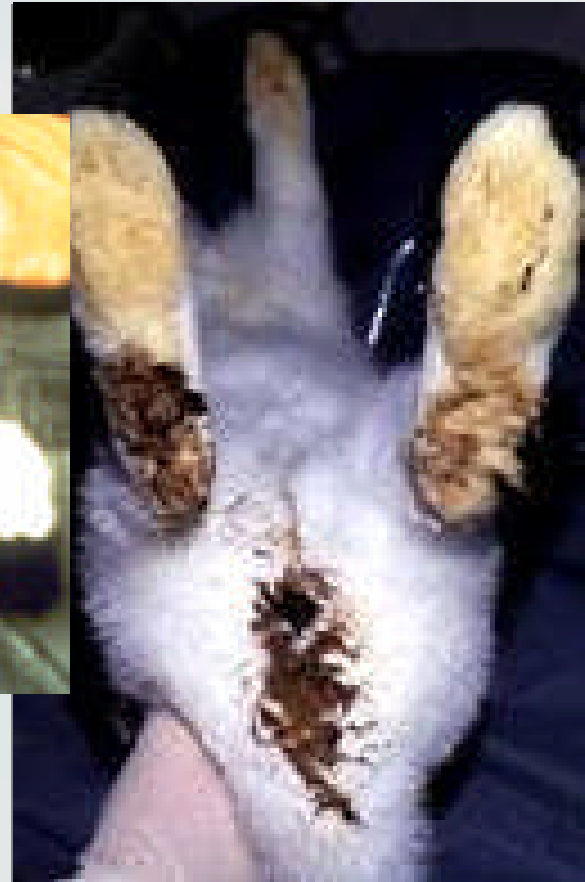
Enteric Diseases



Clostridial



Mucoid



Colibacillosis

❖ What is the etiologic agent?

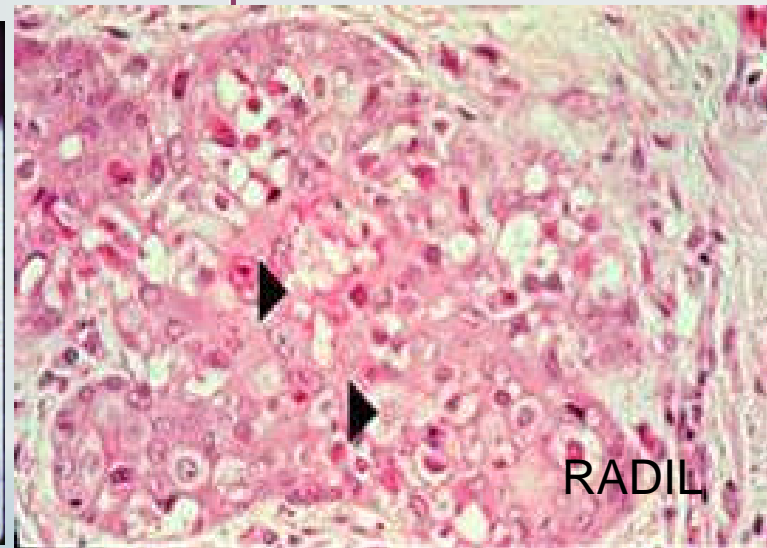
❑ Myxoma virus

❖ This virus belongs to what family of viruses?

❑ Poxviridae (*Genus: Leporipoxvirus*)

❖ What are the arrowheads indicating?

❑ intracytoplasmic inclusions in the epidermis



❖ **Name the disease?**

☐ Viral Hemorrhagic Disease of Rabbits (VHDR) or Rabbit Hemorrhagic Disease (RHD)

❖ **What type of virus is the etiologic agent?**

☐ Calicivirus (Genus *Lagovirus*)



❖ What is the etiologic diagnosis?

❑ Dermatophytosis

❖ What is the most common dermatophyte seen in rabbits?

❑ *Trichophyton mentagrophytes*

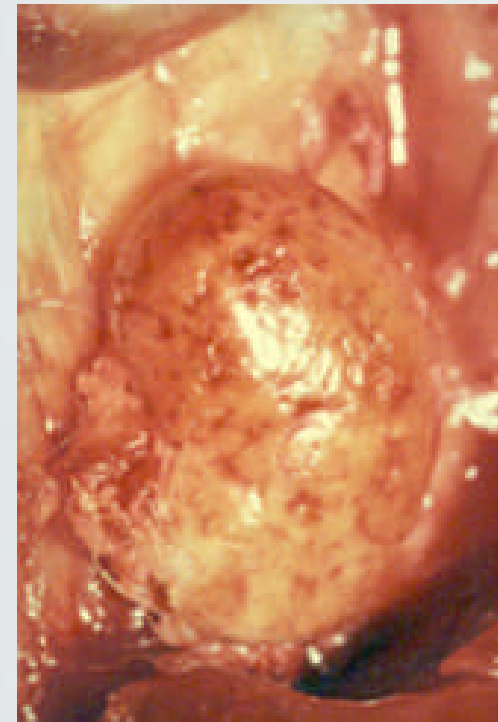
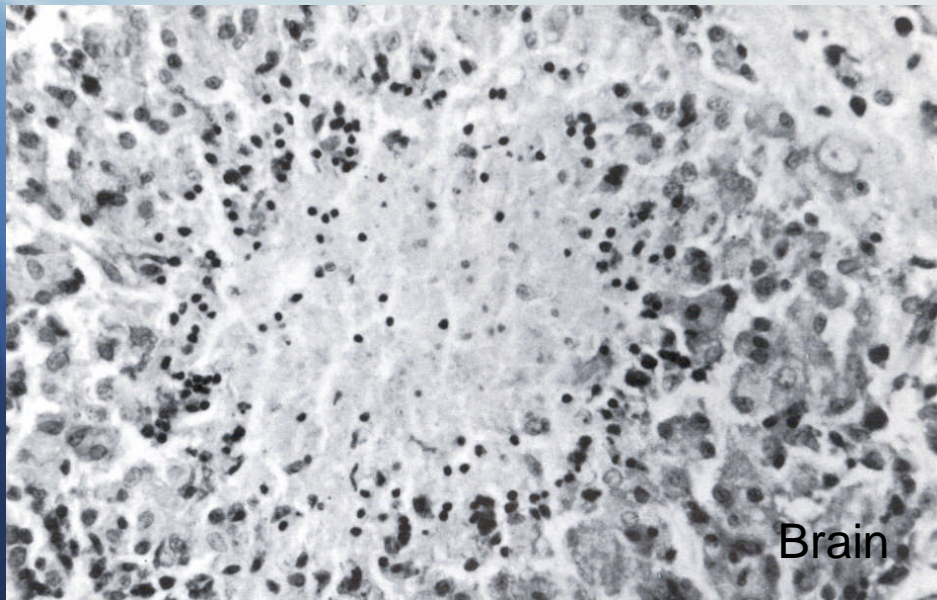


❖ What is the etiologic diagnosis?

❑ Encephalitozoonosis

❖ What is the etiologic agent?

❑ *Encephalitozoon cuniculi*



Encephalitozoon cuniculi

❖ What stains differentiate *E. cuniculi* from *Toxoplasma*?

- ❑ Giemsa, Gram, and Goodpasture

- remember “3 G’s for E”

❖ What are the staining characteristics of *E. cuniculi* and *Toxoplasma*?

- ❑ *E. cuniculi* stains poorly with H&E and well with Gram stain (Gram positive)

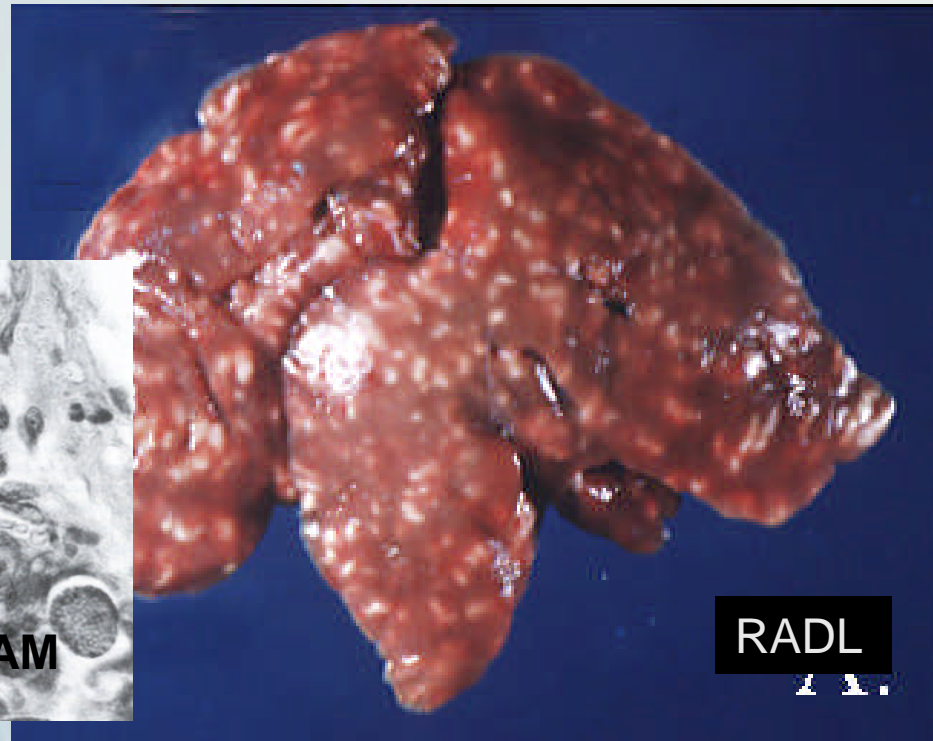
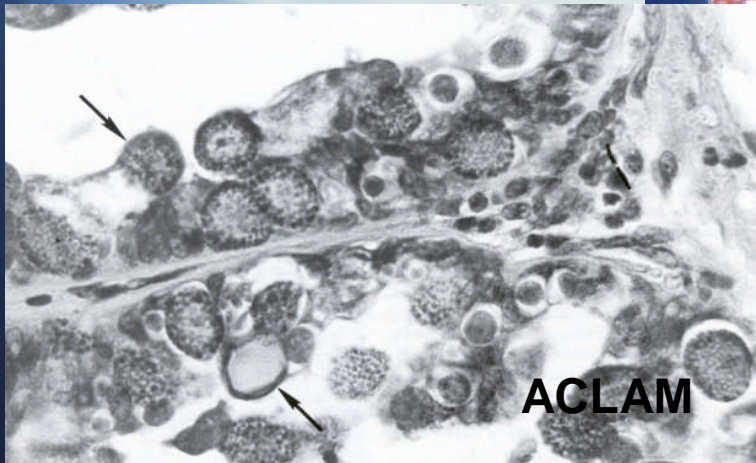
- ❑ *Toxoplasma* stains well with H&E and poorly with Gram stains (Gram nothing)

❖ What is the etiologic diagnosis?

❑ Hepatic coccidiosis

❖ What is the etiologic agent?

❑ *Eimeria stiedae*



❖ What is the Genus and species for #1, #2, and #3?

☐ #1 *Emeria magna*

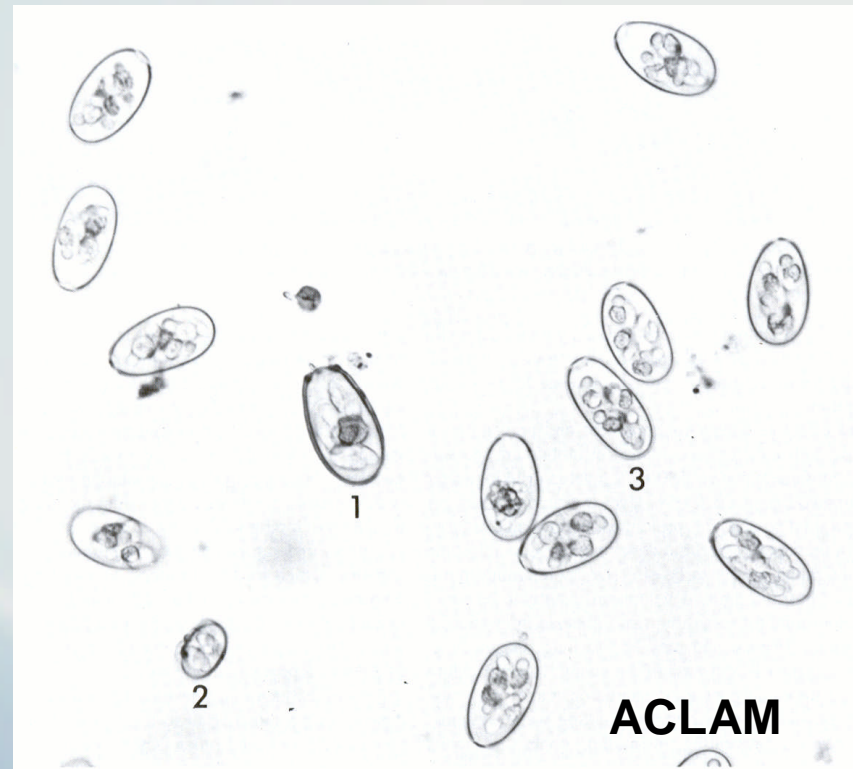
☐ #2 *Eimeria perforans*

☐ #3 *Eimeria stiedae*

❖ What other rabbit coccidia species are not pictured?

☐ *E. irresidua*

☐ *E. media*

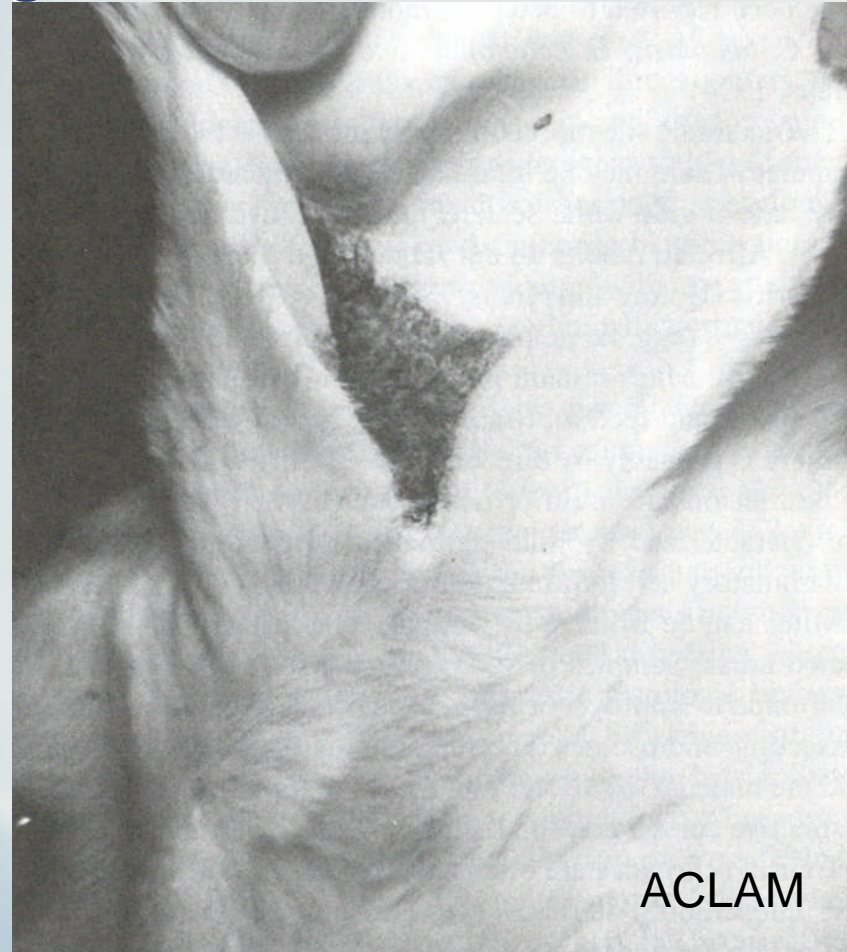
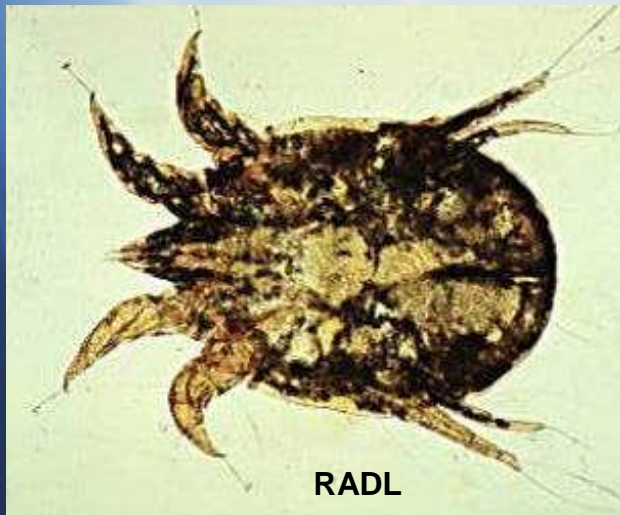


❖ What is the etiologic diagnosis?

☐ Acariasis

❖ Name the etiologic agent.

☐ *Psoroptes cuniculi*



❖ **What is the Genus and species?**

☐ *Cheyletiella parasitovorax*

❖ **Mite or louse?**

☐ *mite*

❖ **Burrowing or non-burrowing**

☐ *Non-burrowing*

❖ **What is the distinguishing feature?**

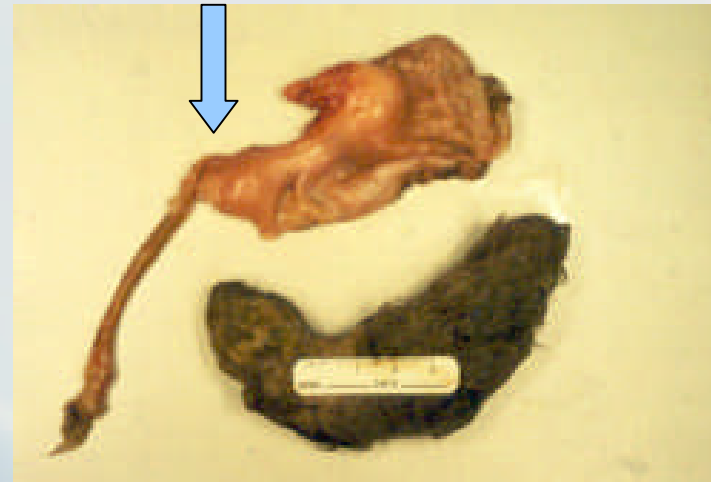
☐ *large curved claws*



GASTRIC TRICHOBEZOARS

❖ Provide 3 predisposing factors.

- ❑ abnormal grooming habits due to boredom.
- ❑ lack of sufficient roughage, minerals, or protein in the diet
- ❑ Inability to vomit and a small pyloric lumen.



GASTRIC TRICHOBEZOARS

❖ What two fruit supplements provide fur digesting proteases?

☐ Pineapple

☐ Papaya

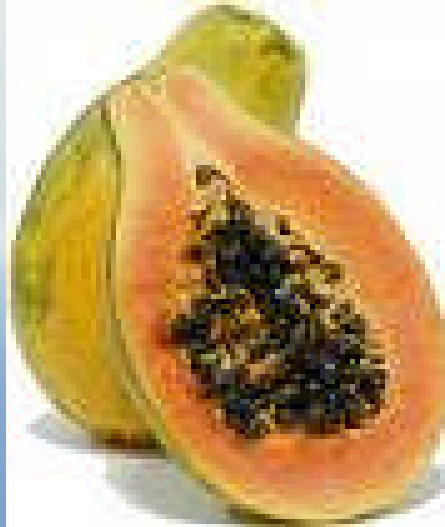
❖ Name the proteases for each fruit.

☐ Bromelin

• *pineapple*

☐ Papain

• *papaya*



❖ **What is the morphologic diagnosis?**

☐ Ulcerative pododermatitis

❖ **Name 3 predisposing factors.**

☐ poor sanitation

☐ wire bottom cages

☐ obese rabbits



❖ **What is the diagnosis?**

❑ Traumatic Vertebral Fracture

❖ **What is the most common fracture location?**

❑ generally L7 or its caudal articular processes

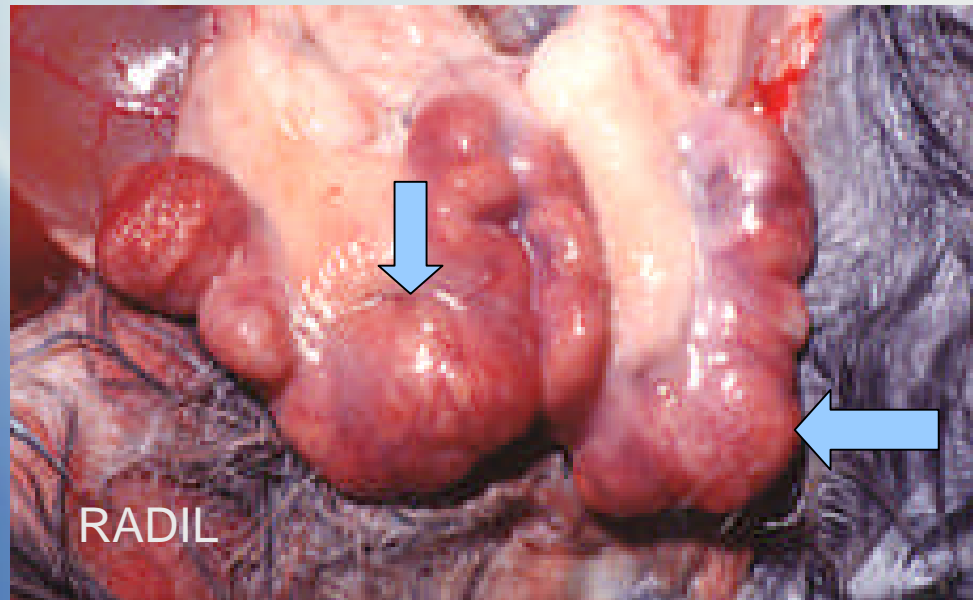


❖ **What is the diagnosis?**

❑ Uterine adenocarcinoma

❖ **How common is this tumor?**

❑ the most common neoplasm of rabbits ≥ 5 yrs with $\geq 50\%$ prevalence



❖ **What is the second most common rabbit neoplasm?**

❑ Lymphosarcoma

❖ **What is the tetrad of necropsy lesions?**

❑ enlarged kidneys, light tan in color with irregular lumpy surface, and thickened cortex but normal medulla

❑ hepatomegaly

❑ splenomegaly

❑ lymphadenopathy



❖ What is the condition?

❑ Malocclusion

❖ What is morphologic cause and mode of inheritance?

❑ mandibular prognathism

❑ an autosomal
recessive trait (mp/mp)
with incomplete
penetrance



❖ What is the diagnosis?

❑ Buphthalmia

❖ What is the mode of inheritance?

❑ autosomal recessive
gene (bu/bu) with
incomplete penetrance



❖ **Name the condition?**

❑ Femoral luxation (Splay Leg)



❖ Name the condition?

❑ Pelger-Huet anomaly

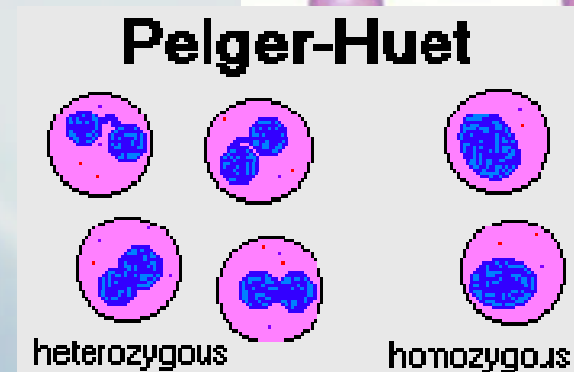
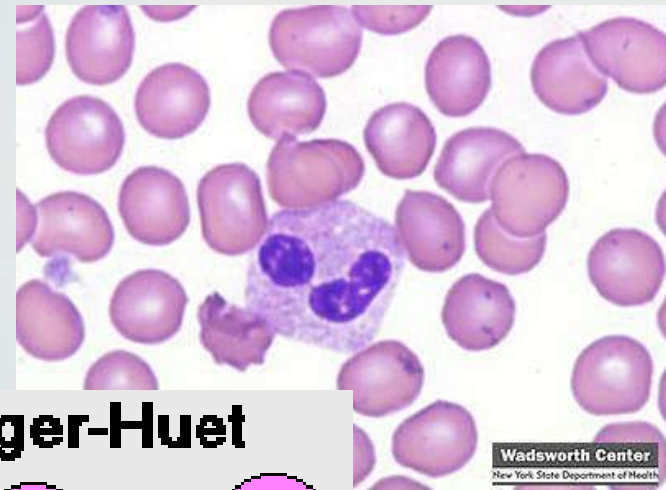
❖ What is the mode of inheritance?

❑ Partial dominant autosomal

- Pg/pg = pelger
- Pg/Pg = super pelger

❖ What other animals are effected?

❑ Also present in man (autosomal dominant), mouse, dog



❖ What is the etiologic agent of enterotoxemia in rabbits?

- a. *Clostridium difficile*
- b. *Clostridium spiroforme*
- c. *Clostridium perfringens*
- d. *Clostridium cocleatum*

b. *Clostridium spiroforme*

**Reference: The Biology of the Laboratory Rabbit.
Manning, PJ. 1994. Academic Press, Inc. New
York. Page 193-195**

❖ **What is the recommended (The Guide) or required (AWA) height for rabbit cages?**

- a. 12 inches
- b. 13 inches
- c. 14 inches
- d. 15 inches

c. 14 inches

❖ **Urine is a source of allergens from which of the following species?**

- a. mouse, rat, rabbit
- b. mouse, rat, Guinea pig
- c. Mouse, dog, horse
- d. Mouse, rabbit

b. mouse, rat, Guinea pig

Reference: *Occupational Health and Safety in the Care and Use of Research Animals*. 1997. NRC, National Academy Press, Washington, D.C. Pages 54-59

❖ Which of the following causes a severe and massive intravascular coagulopathy in rabbits?

- a. Myxoma virus
- b. Pleural effusion disease/infectious cardiomyopathy virus
- c. Rabbit pox
- d. Rabbit hemorrhagic disease virus

d. Rabbit hemorrhagic disease virus

*Reference: The Biology of the Laboratory Rabbit.
Manning, PJ. 1994. Academic Press, Inc. New York.
Page 193-195*

❖ **Ammonium magnesium phosphate and _____ crystals are the major causes of turbidity in rabbit urine.**

- a. biurate
- b. calcium oxalate monohydrate
- c. calcium oxalate dihydrate
- d. calcium carbonate monohydrate

d. calcium carbonate monohydrate

Reference: Laboratory Animal Medicine. 2nd Edition Fox, et al. 2002. Academic Press, Inc. London. pp. 333

❖ **Choose the correct statement regarding Cottontail Rabbit (Shope) papillomavirus:**

- a. Neoplastic transformation only occurs in epidermis-bearing hair follicles.
 - b. Papillomatosis occurs most frequently as a natural disease of the wild hare in the Eastern United States.
 - c. Transmission of the virus may occur by vectors such as the flea.
 - d. Characteristic skin tumors may occur anywhere on the body including the oral cavity.
-
- a. Neoplastic transformation only occurs in epidermis-bearing hair follicles.

Reference: The Biology of the Laboratory Rabbit. Manning, PJ. 1994. Academic Press, Inc. New York. Page 185-186

❖ **When transferring rabbit kits to a foster dam one should select which of the following management strategies?**

- a. Add younger kits to an older litter
- b. Add older kits to a younger litter
- c. Only litters of the same age can be co-mingled with success
- d. Foster rearing is highly unreliable, with only a 15-20% success rate

b. Add older kits to a younger litter

Reference: The Biology of the Laboratory Rabbit. Manning, PJ. 1994. Academic Press, Inc. New York. Page 41

❖ **Rabbits have four types of papillae on their tongues. These include _____.**

- a. Stellate, vallate, foliate, fungiform
- b. Vallate, foliate, fungiform, filiform
- c. Stellate, fungiform, filiform, fusiform
- d. Fungiform, fusiform, vallate, cuniform

b. Vallate, foliate, fungiform, filiform

Reference: The Biology of the Laboratory Rabbit. Manning, PJ. 1994. Academic Press, Inc. New York. Page 52

❖ **Select the correct statement concerning the rabbit urogenital system.**

- a. Rabbit renal tubules cannot be separated with the basement membrane intact.
 - b. In the rabbit most of the glomeruli touch the renal surface.
 - c. The number of glomeruli in the rabbit kidney increases after birth.
 - d. Unlike humans, rabbits have a complex renal medulla which accounts for their high urine-concentrating ability.
- c. The number of glomeruli in the rabbit kidney increases after birth.

Reference: The Biology of the Laboratory Rabbit. Manning, PJ. 1994. Academic Press, Inc. New York. Page 54

❖ What is the genus of this rabbit parasite?

- a. *Obeliscoides*
- b. *Trichostrongylus*
- c. *Nematodirus*
- d. *Passalurus*
- e. *Trichuris*



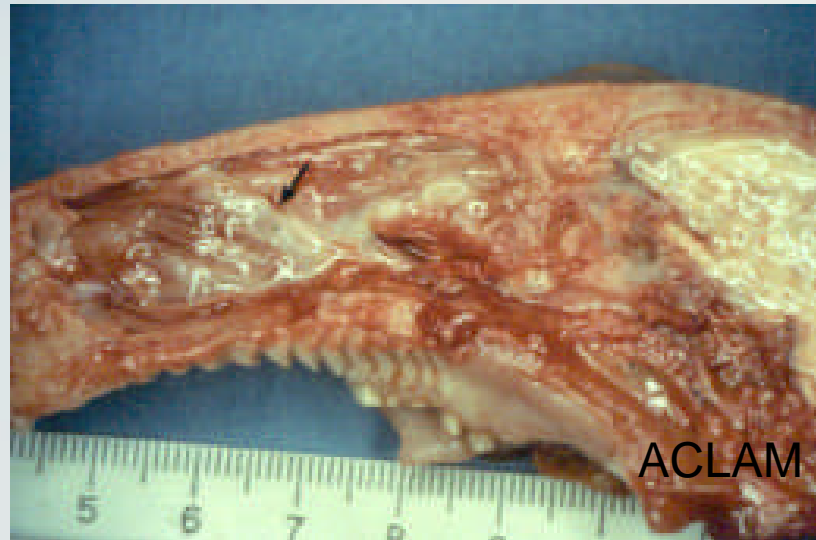
d. *Passalurus*

Reference: Laboratory Animal Medicine. 2nd Edition Fox, et al. 2002. Academic Press, Inc. London. pp. 350

❖ Give the genus of the most likely etiologic agent of the condition seen in rabbits?

- a. *Bordetella*
- b. *Pasteurella*
- c. *Streptococcus*
- d. *Klebsiella*
- e. *Staphylococcus*

b. *Pasteurella*



❖ **According to USDA Standards, a 5.0 kg rabbit should be housed in a primary enclosure with a minimum floor space of what?**

- a. 3.0 square feet
- b. 4.0 square feet
- c. 4.3 square feet
- d. 5.0 square feet
- e. 6.0 square feet

b. 4.0 square feet

Reference: 9 CFR, Part 3, Subpart C, Section 3.53

❖ **According to USDA Standards for the rabbit, which of the following statements about indoor housing is not correct?**

- a. Heating is not required for indoor housing.
- b. Auxiliary ventilation shall be provided when the ambient temperature is 72°F or higher.
- c. Adequate ventilation shall be provided at all times.
- d. Interior building surfaces shall be constructed and maintained so that they are substantially impervious to moisture and may be readily sanitized.

b. Auxiliary ventilation shall be provided when the ambient temperature is 72°F or higher.

Reference: 9 CFR, Part 3, Subpart C, Section 3.51

❖ **According to USDA Standards for the rabbit, which of the following statements about outdoor housing is not correct?**

- a. Sufficient shade shall be provided to allow all rabbits to protect themselves from the direct rays of the sun
- b. A sprinkler system or other means shall be provided for cooling when when the atmospheric temperature exceeds 90°F.
- c. Outdoor housing facilities shall be fenced or otherwise enclosed to minimize the entrance of predators.
- d. Shelter shall be provided for all rabbits when the atmospheric temperature falls below 61°F.
- d. Shelter shall be provided for all rabbits when the atmospheric temperature falls below 61°F.

Reference: 9 CFR, Part 3, Subpart C, Section 3.52

❖ **According to USDA Standards for the rabbit, which of the following statements about primary enclosures is not correct?**

- a. A suitable nest box containing clean nesting material shall be provided in each enclosure housing a female with a litter less than one month of age.
 - b. Food and water receptacles shall not be included in floor space calculations.
 - c. Innovative primary enclosures that do not meet the space requirements but provide rabbits with sufficient volume of space and the opportunity to express species-typical behavior, may be used when approved by the Attending Veterinarian.
 - d. Litter shall be provided in all primary enclosures having solid floors.
- c. Innovative primary enclosures that do not meet the space requirements but provide rabbits with sufficient volume of space and the opportunity to express species-typical behavior, may be used when approved by the Attending Veterinarian.

Reference: 9 CFR, Part 3, Subpart C, Section 3.53

❖ **According to USDA Standards for the rabbit, which of the following statements is not correct?**

- a. All food receptacles shall be kept clean and sanitized at least once weekly.
- b. With solid floors, soiled litter shall be removed and replaced with clean litter at least once each week.
- c. With wire or mesh floors, the pans under the enclosures shall be cleaned at least once each week.
- d. Primary enclosures for rabbits shall be sanitized at least once every 30 days.

- a. All food receptacles shall be kept clean and sanitized at least once weekly.

Reference: 9 CFR, Part 3, Subpart C, Section 3.54

❖ **According to USDA Standards for the rabbit transport enclosure, what is the minimum height of the words “Live Animal”?**

- a. Not less than 4 inches
- b. Not less than 3 inches
- c. Not less than 2 inches
- d. Not less than 1 inch

d. Not less than 1 inch

Reference: 9 CFR, Part 3, Subpart C, Section 3.61

❖ **According to USDA Standards for a rabbit transport enclosure with ventilation on two opposite walls, _____ percent of the total surface area of each wall is required?**

- a. 20%
- b. 16%
- c. 8%
- d. 10%

b. 16%

Reference: 9 CFR, Part 3, Subpart C, Section 3.61

❖ According to “The Guide”, *Bordetella bronchiseptica* characteristically produces only subclinical infections in rabbits, but severe respiratory disease might occur in _____?

- a. Guinea pigs
- b. Dogs
- c. Pigs
- d. Nonhuman primates

a. Guinea pigs

Reference: The Guide for the Care and Use of Laboratory Animals. ILAR. 1996, page 59

❖ According to “The Guide”, the environmental temperature range for a rabbit should be what?

- a. 64-84°F
- b. 61-84°F
- c. 64-72°F
- d. 61-72°F

d. 61-72°F

Reference: The Guide for the Care and Use of Laboratory Animals. ILAR. 1996, page 32

❖ The rabbit is the intermediate host for *Taenia pisiformis*. Which of the following is the definitive host for these cestodes?

- a. Cat
- b. Pig
- c. Ferret
- d. Dog

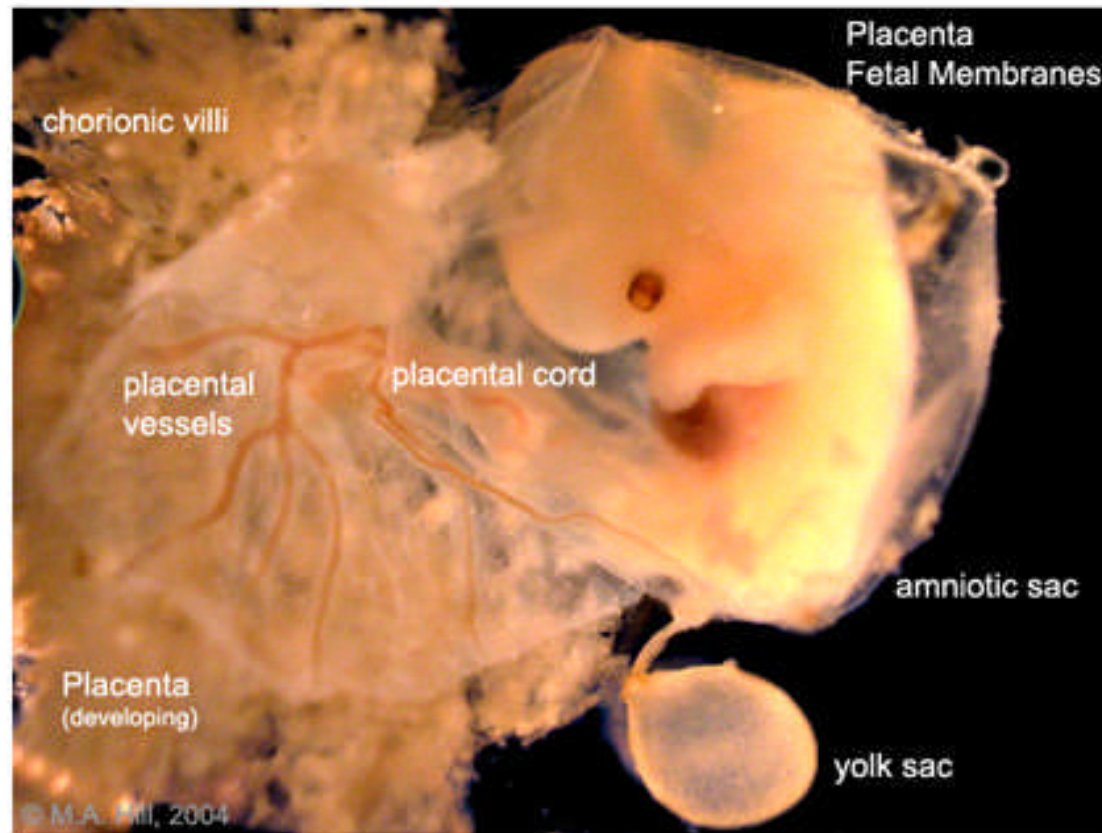
d. Dog

Reference: Laboratory Animal Medicine. 2nd Edition Fox, et al. 2002. Academic Press, Inc. London. pp. 423

❖ **The rabbit intestine is largely impermeable to larger molecular compounds. How do kits receive passive immunity?**

- a. Colostrum, which is composed of smaller molecules in the doe's milk
 - b. Exchange of maternal and fetal blood at the time of birth
 - c. No passive immunity is transferred in the rabbit
 - d. Kits receive most of their passive immunity via the yolk sac before birth
-
- d. Kits receive most of their passive immunity via the yolk sac before birth

Reference: Laboratory Animal Medicine. 2nd Edition Fox, et al. 2002. Academic Press, Inc. London. pp. 332



❖ What protozoal parasite infects rabbits, rodent, and immunodeficient humans: causes granulomatous foci in the brain and kidney; and is best stained with Gram or Goodpasture-carbol fuchsin stain?

- a. *Sarcocystis* spp.
- b. *Toxoplasma gondii*
- c. *Hepatozoon muris*
- d. *Encephalitozoon cuniculi*

d. *Encephalitozoon cuniculi*

Reference: Laboratory Animal Medicine. 2nd Edition Fox, et al. 2002. Academic Press, Inc. London. pp. 348

❖ Which of the following is the best description of *Cheyletiella parasitovorax*?

- a. Pathogenic obligate parasite of rabbits
- b. Nonpathogenic obligate parasite of rabbits
- c. Nonburrowing skin mite of rabbits
- d. Burrowing skin mite of rabbits
- e. Sucking louse of rabbits

c. Nonburrowing skin mite of rabbits

Reference: Laboratory Animal Medicine. 2nd Edition Fox, et al. 2002. Academic Press, Inc. London. pp. 349

- ❖ The rabbit placenta is of what type (Grosser classification)?
 - ❑ Hemoendothelial
- ❖ T/F: The changes in vaginal epithelium during the estrous cycle are a reliable means to determine the physiological state of the reproductive cycle of the rabbit.
 - ❑ False, it is not a reliable means.
- ❖ How many digits on the rabbit forelimb?
 - ❑ 5 digits
- ❖ How many digits on the rabbit hindlimb?
 - ❑ 4 digits

Nathan R. Brewer. 2006. *Historical Special Topic Overview on Rabbit Comparative Biology*. Biology of the Rabbit. JAALAS. 45 (1): 8-24.

References

- ❖ Virus Taxonomy: Eighth Report of the International Committee on Taxonomy of Viruses
H.V. Van Regenmortel, D.H.L. Bishop, M. H. Van Regenmortel, Claude M. Fauquet (Eds)
<http://www.microbiologybytes.com/virology/VirusGroups.html#IV>
- ❖ <http://www.radil.missouri.edu/info/dora/Dora.htm>
- ❖ Nathan R. Brewer. 2006. *Historical Special Topic Overview on Rabbit Comparative Biology*. Biology of the Rabbit. JAALAS. 45 (1): 8-24.
- ❖ *Laboratory Animal Medicine*. 2nd Edition Fox, et al. 2002. Academic Press, Inc. London.
- ❖ The Guide for the Care and Use of Laboratory Animals. ILAR. 1996
- ❖ 9 CFR, Part 3, Subpart C
- ❖ *The Biology of the Laboratory Rabbit*. Manning, PJ. 1994. Academic Press, Inc. New York.