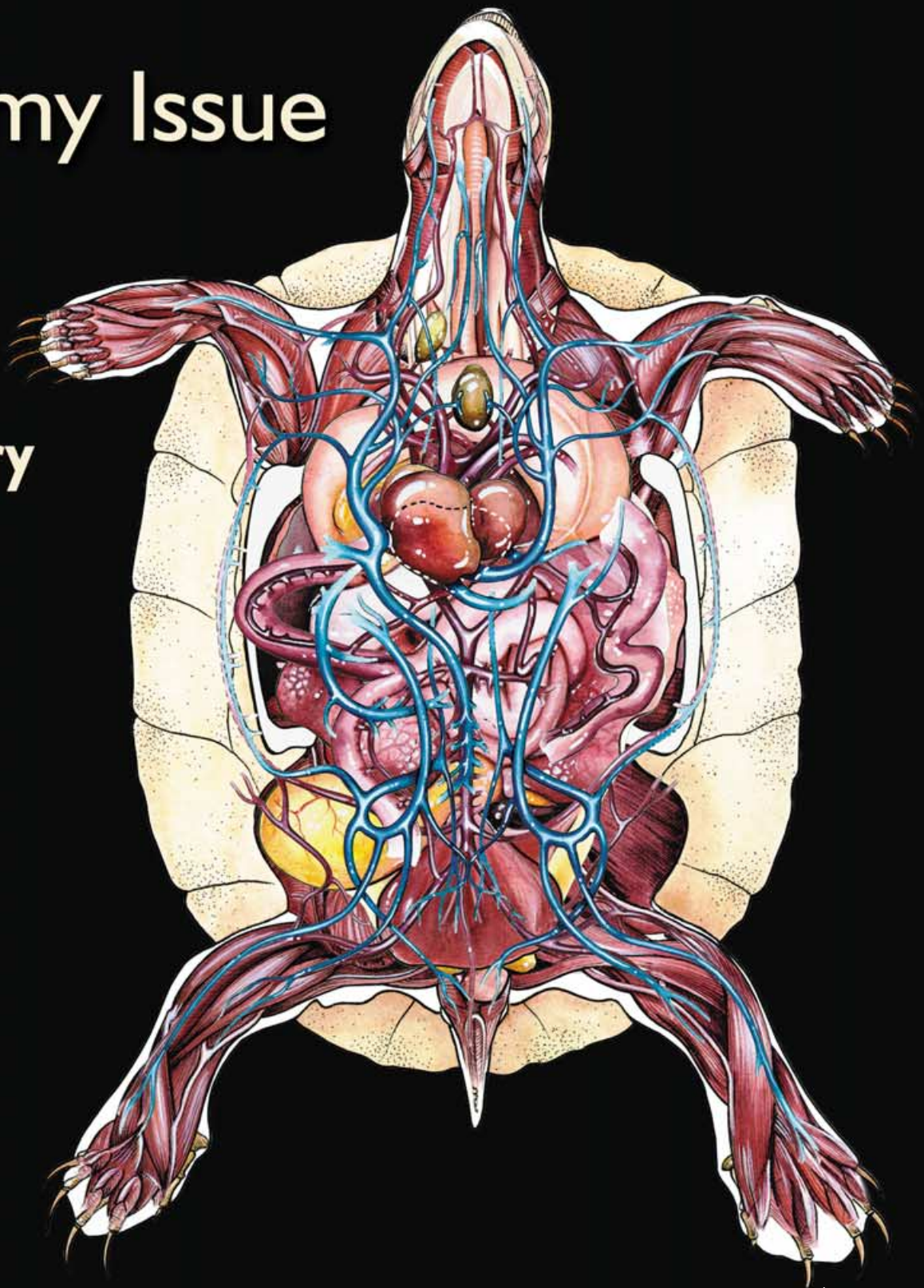
EXOTIC VETERINARY MAGAZINE

DVM
VOLUME 3.2

Anatomy Issue



Reptile Respiratory Anatomy

Anatomy of Pet Hamsters

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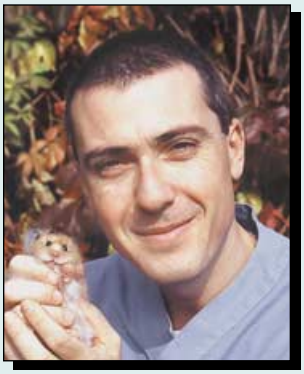
Pet Hamsters: Selected Anatomy and Physiology*

VITTORIO CAPELLO



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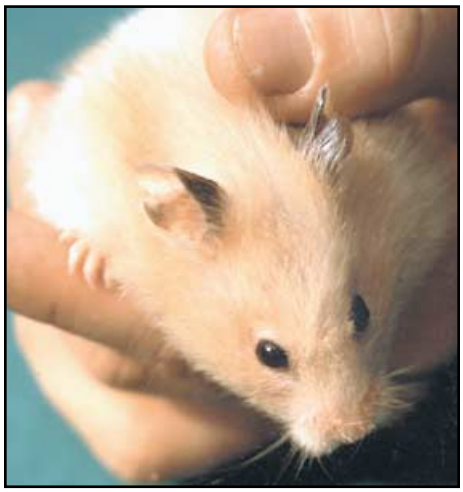
Vittorio Capello graduated in 1989 from the University of Veterinary Medicine in Milan, Italy. His clinical specialties include first and second opinions for small exotic mammals. In Italy, he is a well known author and speaker on ferrets, rabbits and rodents, and is a member of the Association of Exotic Mammal Veterinarians. Recently, he produced a CD-ROM entitled "Atlas of Medicine and Surgery of Pet Hamsters."

* Adapted from the "Testo atlante di medicina e chirurgia del criceto domestico" (Atlas of Medicine and Surgery of the Pet Hamster) CD-ROM. The 388 pages of text (in Italian) contain more than 400 full-color images and 110 clinical cases. For further information, contact the author at capellov@tin.it.



The most popular pet is the **golden hamster** (*Mesocricetus auratus*). Although the most common fur color is golden, this species may also be seen in cinnamon, honey, brown, grey, silver, black, white band, piebald and albino. The eye color may be black, red or unpigmented (as in albinos). All pet hamsters in the world originated from a family founded in Aleppo in 1930. For this reason, the golden hamster is also called the Syrian hamster.

Another common pet species is the **Russian hamster** (*Phodopus sungorus*). It is also known as Djungarian hamster, dwarf hamster, or "furry footed" hamster because the plantar surface of the hind foot is covered with fur. The body fur is grey, and a black stripe extends from the nose down the back. During winter, the fur color may change to a very light grey. Albinos are rare. Russian hamsters are smaller than golden hamsters and less aggressive toward cage mates.

Phodopus roborowskii, known as **Roborowskii Russian hamster**, is similar to the Russian hamster but is slightly smaller and has brown fur in place of the grey.

Although **Chinese hamsters** (*Cricetulus griseus*) are occasionally kept as pets, free-ranging or **European hamsters** (*Cricetus cricetus*) are not kept in captivity. (not pictured)

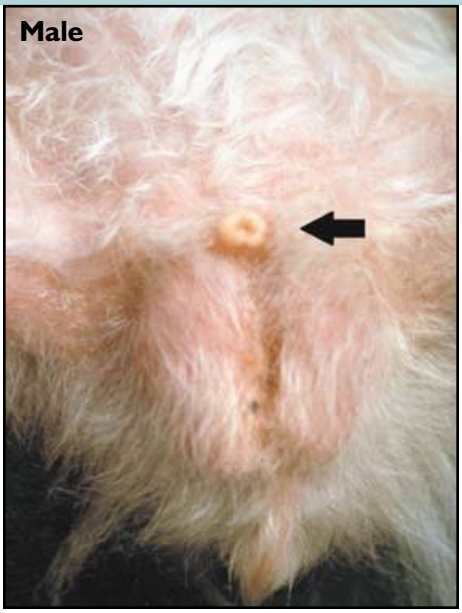
PET HAMSTERS: SELECTED ANATOMY AND PHYSIOLOGY

Sexual Maturity

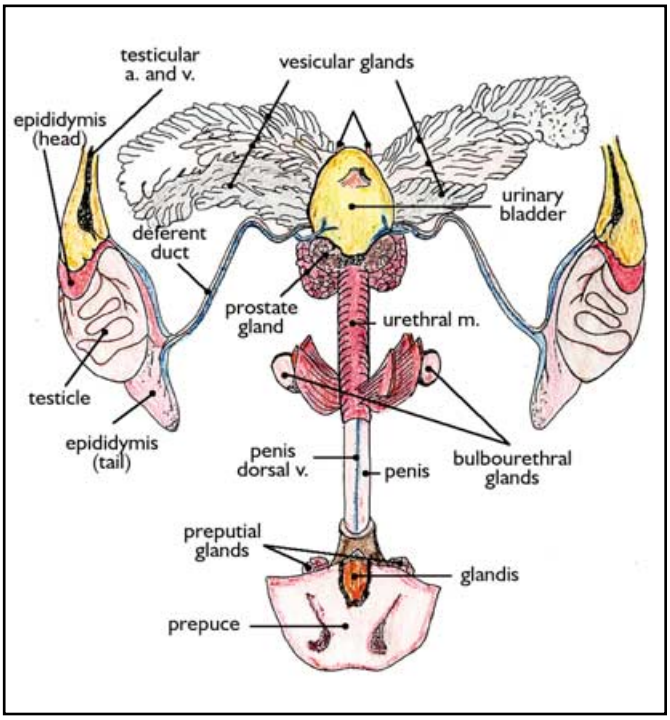
Sexual maturity in the golden hamster occurs in males at 3 months of age and in females, at 2½ months. Females may become extremely aggressive toward males prior to mating. It is recommended to separate the golden hamster male from the female before parturition (this is usually not necessary with Russians). The gestation period lasts l6 days in golden and 20 days in Russian hamsters. Cannibalism of litters frequently occurs with golden hamsters but not with Russians.

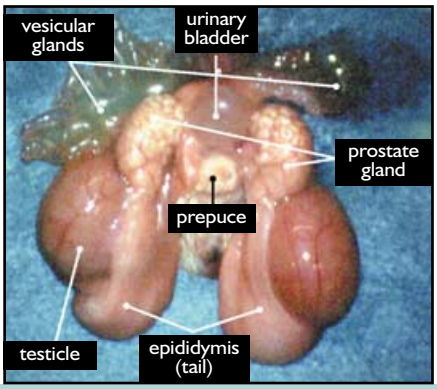
Male Sex Determination

Sex determination is important because hamsters are prolific and are frequently aggressive against cage mates. Male hamsters have particularly large testicles, which lend a rounded shape to the base of the tail. The tail of the epididymis sometimes looks like a small ball positioned at the caudal aspect of the testicle. The prepuce is elevated and rounded (arrow). The skin of the scrotum is not pigmented and is only sparsely covered with fur. Due to the potential of the testicles to be retracted into the abdomen through the inguinal canal, and the presence of fat and fur in Russian hamsters, the rounded shape is not a reliable feature for sex determination. To confirm a male, one should identify the testicles, prepuce and penis.



The illustration depicts male hamster internal and external genitalia (modified from Popesko et al,[12] page 228.) Male hamsters have many seminal glands: vesicular glands, prostate gland, bulbourethral glands, deferent duct glands (not shown in the drawing) and preputial glands.





Female Sex Determination

In female hamsters, the base of the tail is not rounded as it is in males. The distance between the anus and vulva in females is closer than that of the anus to the prepuce in males. The vulva is typically T-shaped.

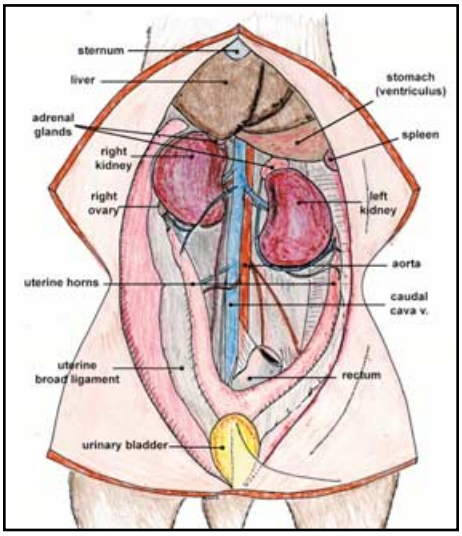


Illustration of female hamster internal genitalia after removal of intestines (modified from Popesko, et al,[12] page 211). The ovaries have a similar anatomic position as in rabbits, and are easy to exteriorize during surgery due to the laxity of the suspensory ligament.

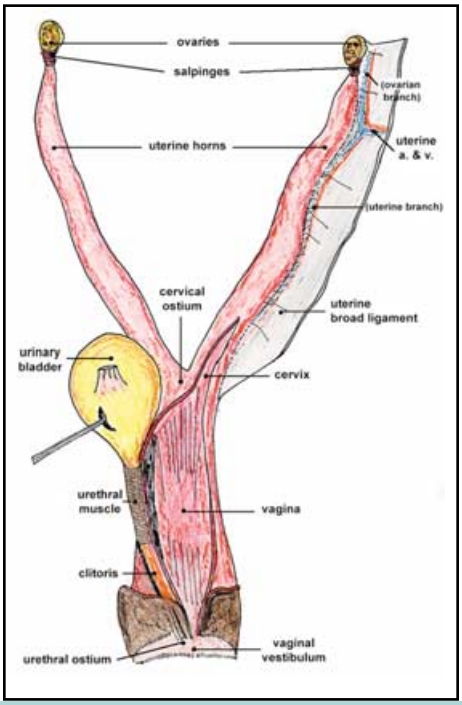


Illustration of female hamster internal and external genitalia (modified from Popesko et al,[12] page 219)

The female reproductive organs are similar to other domestic animals. The uterus is divided into two horns, each with a cervix. The two cervices join in a cervical ostium, which opens into the vagina. The female hamster lacks the singular uterine body that is found in larger mammal species. The urethra opens out of the vagina. A clitoris is present.

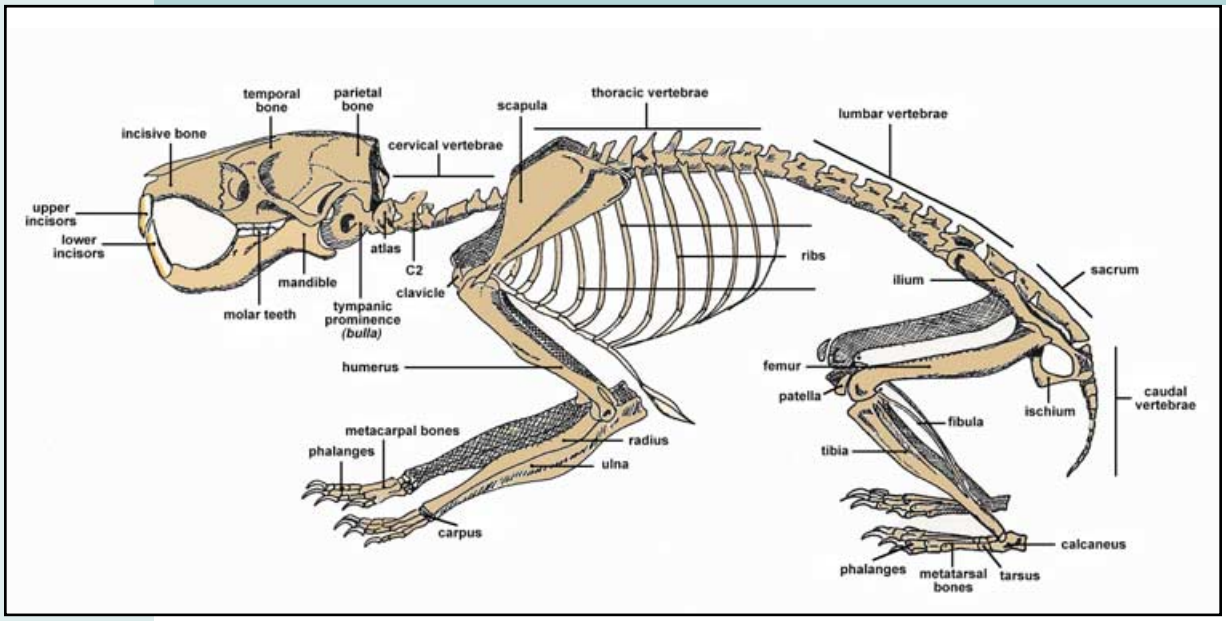
Estrous Cycle

The female hamster estrous cycle lasts 4 days, during which time a dense, yellow-colored, odiferous vaginal discharge is produced. The discharge is licked by the male before mating or by the female itself, but it is common in pet female hamsters to remain in the vagina. When it is particularly thick, it may fill the vagina, predisposing it to infection. The examining veterinarian should check for the presence of the discharge and express it out of the vagina. This secretion should not be confused with pus; it does not represent a clinical sign of vaginitis or endometritis, and medical therapy is not necessary.

Estrous cycles are present during the entire year. Estrus begins in the evening hours, with ovulation occurring between midnight and 1:00 a.m. On day 3, the waxy discharge is present. Estrus occurs 1-8 days after parturition.[2,5]

The typical cytology of estrous vaginal discharge includes a large amount of mucoid material and many bacteria on and around anucleate superficial cells; neutrophils (heterophils) and red blood cells are not seen. This lack of neutrophils distinguishes the normal estrous discharge from that seen with pyometra. (Courtesy of Raffaella Capitelli, DVM)

PET HAMSTERS: SELECTED ANATOMY AND PHYSIOLOGY



Hamster skeleton, left lateral view. (Modified from: Popesko et al,[12] page 170).

Cheek Pouches

The primary anatomical peculiarity of the hamster is the presence of cheek pouches. Hamsters use pouches to store and transport food to their burrows. Skin laxity allows the hamster to fill the pouches from the cheek to the scapulae. The inner surface is covered with keratinized epithelium. The filling sequence of the cheek pouch is shown in a golden hamster.

Molar Teeth

Hamsters, like other myomorph rodents (mice, rats, gerbils) have 12 double-rooted brachydont molar teeth, which do not grow during the animal's life. There are no premolars. Hamsters are different from hystricomorph rodents (guinea pigs, chinchillas, degus), which have both incisor and molar hypsodont teeth. Hamster molar teeth cannot undergo malocclusion or develop spurs like rabbit and chinchilla molars that continue to grow.

The complete dental formula in the hamster is:

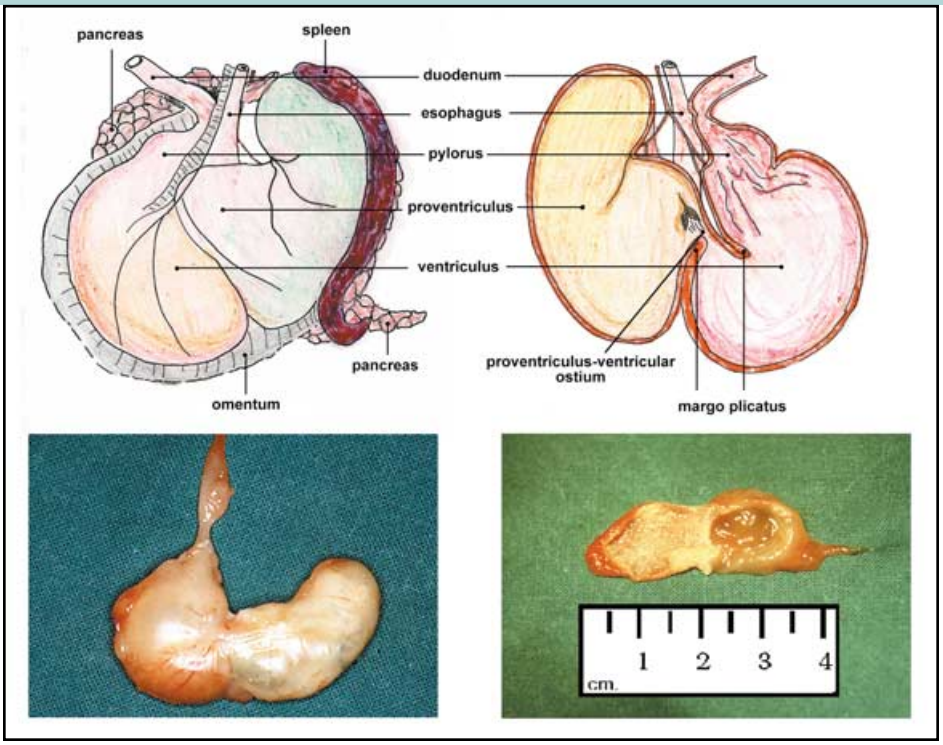
1I 0C 0P 3M

1I 0C 0P 3M

Hamster skull, left lateral view.

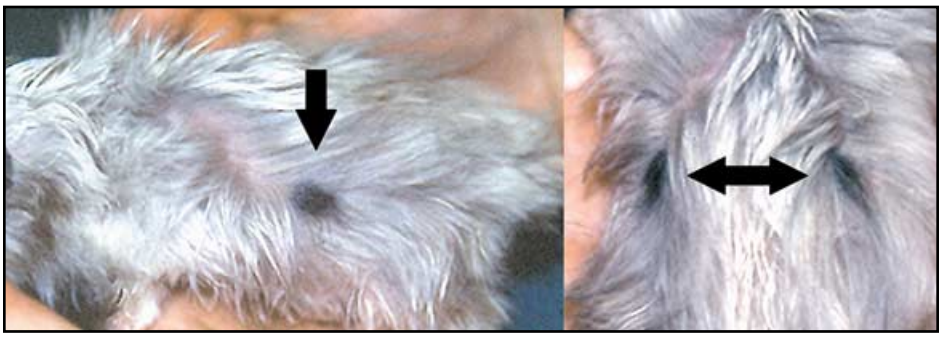
Incisor Teeth

Similar to other species of rodents, hamsters have four incisor teeth. These are hypsodont and grow throughout life. The incisors do not have true roots and are composed of crown only. The lower tooth crown is normally three times longer than the upper tooth crown. The labial (anterior, convex) face of the incisors is covered with a thick, yellow/orange enamel that increases the tooth strength. The oral (posterior, concave) face is covered with cementum.



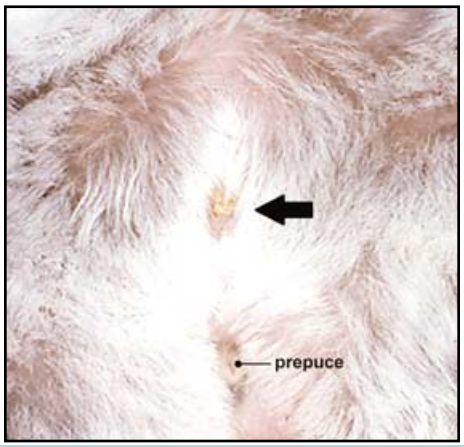
Stomach

The hamster stomach shows an anatomical peculiarity not present in all rodent species. It is divided into a non-glandular forestomach (*proventriculus*) and a true or glandular stomach (*ventriculus*). The two parts are divided by a muscular septum (*margo plicatus*) and connected by an opening (*proventriculus/ventricular ostium*). The proventriculus is covered with keratinized mucosa and the ventriculus with glandular mucosa. The cardia is located in the proventriculus.



Glands

Golden hamsters have paired flank glands. They are symmetrical and appear like rounded, dark brown or grey areas located on the back, lateral to the vertebral column. These are sebaceous glands, which produce the scent that is useful for marking territories and attracting females. The flank glands are more visible in males than in females, and should not be misidentified as skin tumors. Russian hamsters do not have flank glands, but have scent glands located in an area in the middle of the abdomen surface (arrow).



References

1. Anderson NL: Basic husbandry and medicine of pocket pets. *In:* Birchard SJ, Sherding RG: Saunders Manual of Small Animal Practice. Philadelphia, WB Saunders Co, 1994, pp 1363-1389.
2. Battles AH: The biology, care and diseases of the Syrian hamster. Comp Cont Ed Pract Vet 7:815-824, 1985.
3. Bauck L, Bihun C: Basic anatomy, physiology, husbandry, and clinical techniques. *In* Hillyer EV, Quesenberry KE (eds): Ferrets, Rabbits and Rodents. Clinical Medicine and Surgery. Philadelphia, WB Saunders Co, 1997, pp 291-306.
4. Ghoshal NG, Bal HS: Histomorphology of the hamster cheek pouch. Lab Anim 24: 228-233, 1990.
5. Hafez ESE: Reproduction and Breeding Techniques for Laboratory Animals. Philadelphia, Lea & Febiger, 1970.
6. Harkness JE, Wagner JE: The Biology and Medicine of Rabbits and Rodents 4th ed. Philadelphia, Williams & Wilkins, 1995.
7. Johnson-Delaney CA: Hamsters. *In:* Exotic Companion Medicine Handbook. Lake Worth, FL, Zoological Education Network, 2000, pp 47-61.
8. Kuijpers MHM, Van de Kooij AJ, Slootweg PJ: The rat incisor in toxicologic pathology. Toxicologic Pathol 24(3):346-360, 1996.
9. Leck S: Exotic Pet Care: Hamsters. EXOTIC DVM 2(5):38-41, 2000.
10. Losco PE: Dental dysplasia in rats and mice. Toxicologic Pathol 23(6):667-688, 1995.
11. Percy DH, Barthold SW: Hamster. *In:* Pathology of Laboratory Rodents and Rabbits. Ames, Iowa State University Press, 1993, pp 115-136.
12. Popesko P, Rajtovà V, Horàk J: A Colour Atlas of Anatomy of Small Laboratory Animals Vol 2: Rat, Mouse, Hamster. Bratislava, Wolfe Publishing Ltd, 1992.
13. Wagner JE, Farrar PL: Husbandry and medicine of small rodents. Vet Cl No Am Small Anim Pract 17:1061-1087, 1987.