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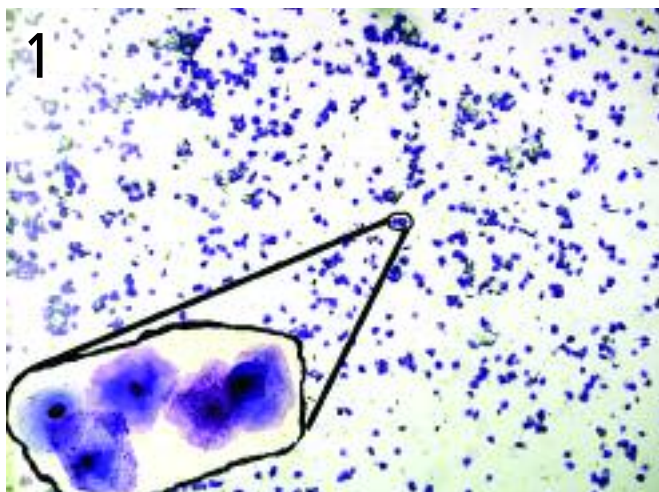
# Determining Estrous Status



A 4-year-old, female hound presented with vulvar swelling and discharge.

**History.** The bitch was last in estrus approximately 7 months ago. Vulvar swelling and a serosanguinous vulvar discharge has been noticed for the last 4 days. The owner wants to wait about 9 more days to breed with fresh semen on the 13th day.

**Procedure.** To determine the best time to breed the bitch, a vaginal cytology sample is obtained (Figure 1).



Vaginal cytology smear that was obtained from a 4-year-old hound (40× with 1000× inset, Dif-Quik stain)

### ASK YOURSELF ...

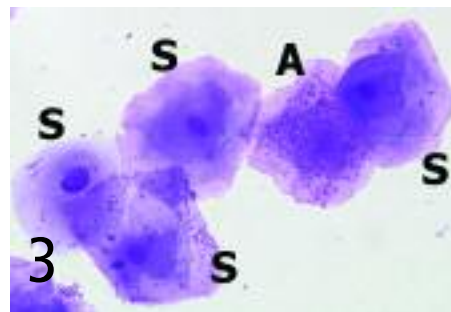
- What is the proper way to obtain this sample?
- What types of cells do you see in the sample?
- What stage of estrus would you estimate this to be?
- What are the types of cells found in a vaginal cytology examination?
- What other method(s) could you use to determine more exactly what stage of the estrous cycle this is?
- How can you determine when the bitch is out of estrus?

## DID YOU ANSWER ...

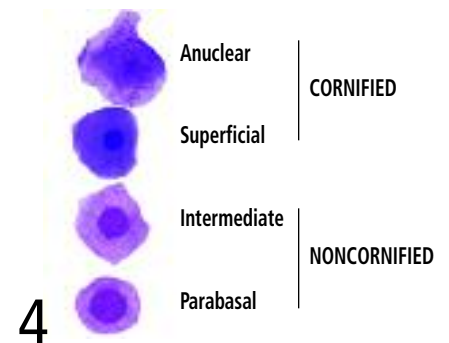
- A vaginal cytology sample is made by inserting a moistened cotton swab into the posterior vagina, being sure to enter the area anterior to the vestibule. Care should be taken to avoid entering the urethra and bladder (**Figure 2**). Pulling the vulva dorsally and angling the swab vertically and toward the posterior can help avoid the urethra.
- These are all cornified cells. They are mostly superficial cells and anuclear squames (**Figure 3**). Anuclear squames are misnamed; the nucleus is not absent but it is not visible as it takes up stain poorly.
- This bitch is in estrus; however, the exact day of estrus cannot be determined by vaginal cytology, because the cytology remains cornified throughout estrus.
- Parabasal, intermediate, superficial, and anuclear are the cell types. Noncornified cells are named parabasal and intermediate (**Figure 4**). They have a "fried egg" appearance with a live nucleus, which can be identified by stippling. Cornified cells appear to be more "corn flake"-like. The nucleus is either pyknotic (superficial) or not visible (anuclear).
- A serum progesterone test could help determine the day of ovulation. If the progesterone is < 1.9 ng/ml, the dog is in early estrus; if it is around 2.0 ng/ml, she is near the luteinizing hormone (LH) peak and should be bred in 3 to 5 days. If the progesterone is around 5 ng/ml, she is ovulating and should be bred in 1 to 2 days if fresh semen is to be used.
- The vaginal cytology will abruptly change to approximately 50% noncornified cells when the bitch is out of estrus, and metestrus cells may be seen (**Figure 5**). This day can be used to estimate when the LH peak occurred (8 days before), when ovulation occurred (6 days before), or when whelping will occur (57 days later).



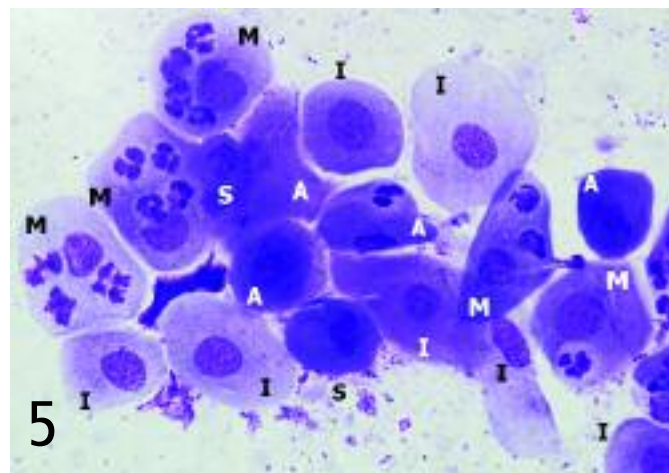
A diagram of a vaginal cytology sample collection. A moistened cotton swab is inserted. Pulling the vulva dorsally and angling the swab vertically and toward the posterior can help avoid the urethra. The swab is then pushed cranially into the posterior vagina, beyond the vestibule.



Cornified cells in a vaginal cytology smear. They are superficial (S) and anuclear (A). Note the "corn flake"-like cytoplasm and the dead nucleus (pyknotic in the superficial and not visible in the anuclear). (1000x, Dif-Quik stain)



Canine vaginal cytology cells: Parabasal, intermediate, superficial, and anuclear. Noncornified cells are parabasal and intermediate. They have a "fried egg" appearance with a live nucleus, which can be identified by its stippling. Cornified cells are more "corn flake"-like in appearance. The nucleus is either pyknotic (superficial) or not visible (anuclear).



A vaginal cytology specimen from the first day of diestrus. There are anuclear cells (A), intermediate cells (I), and superficial cells (S). There are many "metestrus" cells (M), which are intermediate cells that have neutrophils inside the cytoplasm. (1000x, Dif-Quik stain)