Ticks have a life cycle that starts with an egg, which hatches into a 6-legged larva, which molts to become an 8-legged nymph, which molts to become an adult. A blood meal is required by the larval, nymph, and adult stages of the tick to progress through the life cycle and to lay eggs. Consequently, larvae, nymphs, and adult ticks feed on reptiles, birds, or mammals. Depending on the species of tick and the stage of the life cycle, the tick may be the size of a small pinhead or as large as a grape. Ticks in each stage of the life cycle may transmit disease; however, the ability to transmit a disease is dependent on the species of tick, its life cycle stage, and the disease agent.

Included among the diseases and organisms transmitted by ticks in North America are Ehrlichia, Anaplasma, Babesia, Borrelia (Lyme disease), Rickettsia (Rocky Mountain spotted fever), Coxiella (Q fever), Francisella (tularemia), flavivirus (Powassan encephalitis), and Bartonella.

Tick season lasts from spring (larvae and nymphs) until late fall (adults), but tick-borne disease is encountered in people and pets year round. The Diagnostic Center for Population and Animal Health (DCPAH) offers a variety of diagnostic assays to detect tick-borne disease in animals and in ticks recovered from animals. As indicated in the chart below, DCPAH offers assays to screen animals for antibodies against the major tick-borne diseases and to detect the tick-borne pathogens either directly in the tick or in the animal. For ticks submitted for identification and for pathogen detection, DCPAH will perform PCR assays for the pathogens normally carried by that species of tick.

Over the last 2 years, the laboratory has performed tick-borne disease serology on over 1,200 serum samples from dogs alone. The serum samples came to DCPAH from all parts of the U.S. and Canada. We have found serologic evidence of infection of dogs with Babesia (30), Ehrlichia (23), Borrelia (357), Rickettsia (90), and Anaplasma (69). Several dogs were infected by more than one organism. Our diagnostic assays accommodate more than dogs and we have tested samples from alpaca, bears, cats, horses, and primates. If you have questions regarding the tick-borne disease testing offered at DCPAH, please call 517-353-1683 and ask for the Parasitology Lab.

### TABLE 1: Tick-Borne Disease Testing at DCPAH

- **Serology: Tick-Borne Disease Antibody Screen**
  - Includes Babesia canis, Borrelia burgdorferi, Ehrlichia canis, Anaplasma phagocytophilum and Rickettsia rickettsii
  - $77 for all of the above

- **PCR on Blood Sample**
  - Babesia sp, Borrelia sp, Ehrlichia canis, Anaplasma sp, and Rickettsia sp
  - $35 for first PCR, $10 for each additional PCR

- **Identification of Tick and PCR for Pathogens**
  - Babesia sp, Borrelia sp, Ehrlichia canis, Anaplasma sp, and Rickettsia sp
  - Tick ID: $10
    - Disease Testing after ID: $45 (includes 3-4 PCRs)

**FIGURE 1:** Common tick species in the US and pathogens that they may carry.
A Message From DCPAH’s Director...

DCPAH Is Committed to Providing Continuous Service and Process Improvements

DCPAH has been making a significant effort over the last several years to become more customer-focused, and we hope that you have noticed the changes! Our initiatives have included process redesign to decrease test turn-around times, new test offerings, new submittal forms, a redesigned website, and provision of pre-paid FedEx shipping and mailer options to make sure your samples arrive at DCPAH quickly. It is our plan to continue improving our customer service by providing state-of-the-art diagnostic service within an academic atmosphere that encourages innovation and in-depth consultation. We welcome your suggestions for service improvements.

As is true for most businesses, our costs have increased significantly over the last year (equipment, materials, supplies, shipping, etc.). This trend caused us to examine our fee structure. The last comprehensive review and adjustment of fees was in the spring of 2006. As a result of our review, a new fee schedule was developed and took effect on September 1, 2008. Overall the fees have increased approximately 7%, with some variation from test to test. The new fee schedule is included in this newsletter and is also available on our website at www.animalhealth.msu.edu. We regret the need to raise our fees, but it is the only way we can continue to provide the breadth and depth of service expected by our clients.

We appreciate your continued business and look forward to partnering with you to provide the best in diagnostic medicine so that you can meet the diverse needs of your clients.

DCPAH Mailers

To Insulate Or Not to Insulate

DCPAH offers a number of mailer options for purchase, and we often get calls from clients asking what advantage there is to buying our mailers instead of shipping on their own. In addition, if they did choose to use a DCPAH mailer, how do they decide which one is best? Here are some answers:

DCPAH mailers meet all shipping guidelines and come pre-packaged with everything you need, including instructions, to guarantee the safe arrival of your specimen to our laboratory.

DCPAH mailers are available in multiple sizes and most of these include pre-paid U.S. Postal Service shipping or pre-paid FedEx shipping. Depending on your location relative to Lansing, Michigan and the urgency or temperature requirements of your specimen(s), we would make the following recommendations:

- Select USPS mailers if you are geographically close to the DCPAH, or if your specimens are not time- or temperature-sensitive.

- Use FedEx mailers if your specimen is time sensitive—it guarantees next-day delivery (M-F only) and is traceable through the FedEx system.

- Use the new FedEx Insulated mailer if your specimen is time- and temperature-sensitive or if you need to send multiple specimens. The same FedEx guarantees apply.

DCPAH mailer information is available online at www.animalhealth.msu.edu by clicking on the link for Submittal Forms and selecting Products (Supplies) Orders. Compare our mailer prices to your current cost for shipping a specimen to us. We are certain you will be satisfied!

*The mailer does not include ice packs. Call the laboratory at 517-353-1683 to place an order, or use our downloadable product order form on our website at www.animalhealth.msu.edu and fax your order to us at 517-353-5096.*
The first step of cytology is about choosing a road to travel in your pursuit of a diagnosis. But before you can choose the best route you need to have appropriate and readable data and slides, i.e., the signposts. It is NOT helpful if you have too many signs piled deep and obscuring the information of another sign. It is also NOT helpful if the signs are badly damaged and no longer readable. Making good diagnostic smears of fluid samples is the same thing as having appropriate signage for your diagnostic journey.

When a fluid sample is collected, the gross appearance can be very deceptive. Septic exudates may vary from clear to opaque. Placing your sample into an appropriately sized EDTA tube can prevent clot formation and keep the cells individualized for further enumeration, preparation of slides, and cytologic evaluation.

Nucleated cell concentrations and estimation of total protein are very helpful in understanding the causes of effusions. These data can be obtained by submitting your EDTA fluid sample to the Clinical Pathology unit of DCPAH or within your clinic. Nucleated cell concentrations can be determined manually (often using Unopette systems and hemocytometers) or through automated systems when the fluid is free of excessive debris. Total protein concentration is typically estimated using a refractometer.

Slides should be prepared as soon as possible using the ‘blood smear’ technique (Figure 1) on both direct and concentrated (centrifuged) fluid. Blood smears can be prepared with a feathered edge or collecting cells by stopping the smear before the fluid has been distributed (stop-flow technique). Direct smears are very useful in highly cellular fluids where no concentration is needed to evaluate sufficient numbers of cells. Concentration techniques are essential for fluids with low cellularity. Smears are usually prepared from sediment produced after centrifuging the sample in a conical tipped tube (as for urine sedimentation).

Alternatively, a simple concentration unit can be constructed (Figure 2); the cells are allowed to settle onto the glass slide while the fluid is absorbed by the filter paper.

Smears should be prepared from any particles or bits of material in a fluid sample using the two slide method (Figure 3), or by rolling the material on the slide. If larger particles are present, the rolling reduces cell smearing and breakage. The goal is to minimize cell damage and interpret intact cells that are sufficiently spaced and spread to reveal both nuclear and cytoplasmic detail. Slides should be promptly prepared, labeled (source and technique), air dried, and protected from flies, debris, chemicals, cooling, and breakage.

Slides can be stained with any good hematologic stain for in-house review and/or submitted to the DCPAH (with the fluid) for evaluation. If fluid samples are submitted, they should be chilled (NOT frozen) but the slides should be kept at room temperature.
Take A Closer Look At What’s New for Fall 2008 At DCPAH!

- **New Fee Schedule** - Information is enclosed and online at www.animalhealth.msu.edu

- **GlobalVetLink (GVL)** - Submit your EIA/Coggins samples through Michigan's official online eHealth Certificate system for animal health regulatory management. Visit www.globalvetlink.com for more information. GVL samples tested at the DCPAH receive a $2 discount!

Comments and Suggestions to: Michelle Kryska, kryskam@dcpah.msu.edu