



## The Importance of Laboratory Testing for Caged and Aviary Birds

### **Introduction**

Birds are unique in the way they respond to and exhibit their illnesses. You, as a bird owner, must appreciate this fact if you are to recognize illness in your birds and respond promptly to their needs.

All animals have *limited* ability to physiologically compensate for one or more medical problems, involving one or more organ systems. When the animal can no longer compensate, obvious signs of illness are expressed. The term for the period during which an animal is sick but does not show obvious signs of disease is *subclinical illness*. Caged birds seem to have an even greater compensatory ability, and subclinical illness is common in birds. Birds, in fact, appear to "hide" signs of illness. This is actually a preservation response, rather than a deliberate or conscious act.

This preservation response is, no doubt, an evolutionary adaptation. Many birds are flock dwellers, with social hierarchies ("pecking orders"). Any individual struggling to maintain its position in this hierarchy tends to be eliminated from the group. This tendency for members of the same species to harass weaker members of the group eliminates the weaker members' genes from the gene pool, thereby strengthening the species' chances for survival. In spite of benefits for the group, it behooves the individual to look healthy, for as long as possible, to avoid this harassment.

Animal behaviorists believe that the evolutionary establishment of the communal groups (flocks, herds, etc.) resulted from the increased survival of individuals (more eyes and ears to detect predators and other life-threatening situations). Predation often eliminates the weakest members (very young, old or sick) of the group. Again, it behooves the individual to stay as healthy as possible, for as long as possible, to avoid attracting predators to the group and predation on itself.

## **Diagnostic Laboratories**

Subclinical illness in caged birds makes diagnosis of disease difficult. Consequently, the avian veterinarian must rely heavily on diagnostic laboratories to provide tests that can aid in the diagnosis and treatment of disease, as well as help monitor the clinical course of the avian patient.

Bacterial and fungal diseases can be diagnosed in the microbiology laboratory, and the proper and most effective antimicrobial drugs (antibiotics, etc) tend to use in treating the diseases can be determined.

## **Collection and Analysis of Blood**

Blood samples may be obtained from the avian patient in a number of ways. The least stressful and easiest method involves clipping one or more toenails and allowing the blood to flow freely into tiny capillary tubes that contain an anticoagulant. Blood smears are made from a single drop of blood placed on a microscope slide or cover slip. Blood can also be withdrawn from the jugular or a peripheral vein using a syringe equipped with a very small needle. This latter method is often less stressful than nail clipping when dealing with the smaller caged birds (budgies, canaries, finches etc) and may be necessary if a relatively large blood sample is required by the laboratory. Therefore, there is no caged bird that cannot be examined in this manner. Chemical cautery agents are used to stop the nail from bleeding, and finger pressure is used to prevent excessive bleeding when blood is withdrawn from a vein using a needle and syringe.

The blood sample can be examined in 2 different ways. Analysis of the cellular portion of the blood yields red and white blood cell counts. These are useful in diagnosing anemia and determining whether a patient is experiencing enough of an insult to its system to cause changes in the circulating white blood cells. These changes either influence the total number of white blood cells circulating in the peripheral blood or the proportions of the 5 different types of avian white blood cells, or both. Blood smears can be stained and examined for the presence of blood parasites and to obtain information about all the blood's cellular components.

The fluid portion of the blood (plasma) is also examined (blood chemistry evaluation) and yields information about the biochemical status of the patient and the integrity of the patient's vital organs (liver, kidneys, etc). This information provides the clinician with specific diagnoses, such as diabetes and gout. In other cases,

biochemical profiling of the blood indicates the organ systems involved and the severity of the disease.

Blood workups provide information that enables the veterinarian to understand the severity of the patient's condition, know the extent of the disease, and follow the patient's clinical course with successive blood samples. Serial lab testing enables the clinician to follow the patient's progress and make changes in treatment much more rapidly than would otherwise be possible by simply monitoring the patient's visible response (or lack of response) to treatment.

## **Urinalysis**

Examination of the urine from the avian patient presents some obvious problems (collection of large enough volume to analyze, separation of it from the fecal portion of the droppings, etc), but the urine samples are of significant diagnostic value. The urine's physical (color, clarity, specific gravity, pH, etc) properties are analyzed. The urine sample is centrifuged and the sediment is examined for its cellular debris (white and red blood cells, lining cells of the urinary system, etc) crystals, and microorganisms (bacteria, parasites, etc.)

## **Examination of the Body Fluids and Tissues**

The clinical pathology laboratory also enables the veterinarian to examine and analyze various body fluids and cells that may be present in a particular sample. Fluids may be aspirated by syringe from body cavities and cysts, and studied in the same manner as a urine sample. Microscopically examining the cellular portion of the sample is called *cytologic analysis*. Pressing a microscope slide against a particular tissue results in the deposition of some of its cells on the slide's surface. Such impression smears can be made from tissue masses (lumps etc) abscesses, discharges, wounds, etc. Various stains can be used to prepare these impression smears before the microscopic examination. Cytologic and fluid analyses are valuable diagnostic tools in avian medicine.

## **Bacterial Culture and Antimicrobial Sensitivity Testing**

Since infectious diseases are the most common causes of illness in caged and aviary birds, the microbiology laboratory plays a vital diagnostic role for the avian veterinarian. Samples collected from the patient may yield pathogenic (disease-causing) bacteria or fungi. The major function of the microbiology laboratory is to identify these microorganisms so that the appropriate treatment can be initiated.

Once one or more bacterial isolates from a specimen have been identified, the next step is to conduct antimicrobial sensitivity testing. Drug-impregnated discs are placed in contact with colonies of each previously identified microbial isolate. The effectiveness of each antimicrobial is determined by measuring the zone and around each disc in which the growth of the organisms have been completely inhibited. Generally speaking, the larger the zone, the more effective the antimicrobial. It is from these "effective" antimicrobials, then, that the veterinarian selects a drug with which to treat the patient. This type of antimicrobial testing is not used with fungal isolates.

## **The Gram Stain**

Another effective tool available to the avian veterinarian is the Gram stain. Various specimens (feces, discharges, pus, etc) from the patient can be Gram stained and examined microscopically. Such a preparation yields a surprisingly large amount of information: whether or not bacteria and yeasts are present in the sample; the relative numbers of organisms present; their shape and relative size; and their Gram stain reaction (Gram-negative bacteria appear light red or pink and a generally considered the major disease-causing bacteria among caged birds; Gram-positive bacteria appear dark blue or violet and make up most of the normal gastrointestinal and respiratory tract microflora of caged birds). Just knowing this information aids in the tentative identification of the bacteria present. An actual culture would be necessary to make a positive identification. The advantage of the Gram stain is that it represents a relatively inexpensive method of determining the microbiologic status of a patient. More importantly, it provides a convenient method for monitoring a patient's progress during and after antibiotic therapy.

## **Parasite Identification**

Methods employed to diagnose parasitic problems in birds are simpler than the lab methods described previously. As previously stated, blood parasites may be noted upon exam of stained blood smears. External parasites (chewing lice are the most common) either have a superficial location (on or within the feathers) or they may be buried within the top layers of the skin (scaly-face mange in parakeets). Careful visual inspection (with or without magnification) is required to diagnose blood parasites and chewing lice. Visual inspection and skin scraping (microscopic exam of scraped debris) are required to diagnose scaly-face mange. Intestinal parasites are rarely detected by owners. Occasionally, a bird will pass entire worms or parts of worms (roundworms, tapeworms, etc) in the droppings. Sometimes they are seen hanging from the bird's vent. Most often,

however, microscopic exam of droppings is necessary to diagnose intestinal parasitism. Fecal flotations (to detect parasite eggs) and direct smears (fresh feces mixed with saline and examined immediately) are the 2 most common methods.

### **Miscellaneous Laboratory Tests**

Samples for special tests must be submitted to other laboratories for analyses. Diagnosis of lead poisoning (common in caged birds) requires a specific analysis of the patient's blood. Diagnosis of chlamydiosis ("parrot fever") requires submission of feces (or cloacal swabs) or tissue samples to the State Laboratory for specific testing procedures. Blood samples can be submitted to other laboratories for serologic analyses (detection of antibodies to certain disease agents, such as chlamydiosis).

Viral diseases are difficult to diagnose in caged birds. Virus isolation and identification require submission of specific tissues of body fluids, secretions or excretions, and must be performed by State laboratories, or laboratories located within veterinary colleges. These tests are time-consuming and costly.

### **Necropsy**

Ideally, the avian veterinarian would cure every bird presented for treatment. Unfortunately, some avian patients die in spite of the veterinarian's best efforts. In these cases, an autopsy (veterinarians call it a "necropsy") can be extremely useful. The results may confirm the diagnosis suspected before death, or will at least help the veterinarian to better understand why the bird died. This can have tremendous importance to surviving birds (cage mates, etc) and to other similarly ill birds that may be presented to the veterinarian in the future.

The necropsy is an excellent diagnostic tool in an avicultural situation. It is often advisable to sacrifice one or more living individuals of a group to more rapidly arrive at a diagnosis for the disease affecting, or at least threatening, all members of the group. Unfortunately, necropsies do not always provide conclusive results.

Bird owners should submit their deceased bird for necropsy as soon as possible after their death. It is a good idea, soon after death, to immerse the body in ice water for about 30 minutes to rapidly cool the body and delay decomposition. This is especially important with small caged birds. If any delay in necropsy is anticipated, the body should be refrigerated immediately but *not* frozen. Freezing produces

significant changes in the tissues and interferes with the microscopic interpretation of tissue samples. Freezing of the cadaver may be necessary in certain circumstances, but it should be avoided whenever possible.

It is always an unhappy situation when a bird dies. The death is painful for the bird's owner because it often represents the loss of a wonderful and joyful companion or a valuable breeder, or it represents some other loss. The death is distressing, too, for the veterinarian, because it represents treatment failure. A necropsy and the results it provides, however, can be of great value to both parties. The owner of the deceased bird benefits from gaining better understanding of why the bird died and from determining whether or not other birds in the household or aviary are at any risk. The veterinarian is given the opportunity to further his or her own education. Both parties benefit because they are contributing to the advancement of avian medicine and aviculture.