Spectral-Analysis As A Diagnostic Tool For Birds

by Bradly G. Dalton
Virginia

Spectrascopes are nothing really new. They have been in use for years in medical and scientific laboratories. And yet, veterinarians do not seem at all familiar with their use. Aviculturists would do well to learn as much as they can about them for I believe they offer one of the simplest and most meaningful scientific tests that can be done on birds. Unlike most tests that require blood samples – of which birds have precious little – spectral-analysis makes use of that which birds have most of, namely feathers.

Spectral-analysis is simply the process of identifying substances through analysis of the colors or wavelengths emitted when these substances are vaporized by heating. Correctly used, it can analyze quantities too minute to be measured otherwise. Medically it can be used to measure mineral contents of the human body from practically any sample of body tissue. Hair samples are commonly used with spectral-analysis since hair follicle minerals are laid down in the hair shaft in direct proportion to the quantity of minerals absorbed by the body cells that make the hair. If someone is deficient in calcium or suffering from toxic levels of lead, it can be quickly established by analysis of hair samples. Since feathers also reflect the proportion of minerals present in the body cells that manufacture them, they work equally well with spectral-analysis.

Perhaps it would be appropriate at this point if I explained how I came to research spectral-analysis and the uses to which I have applied it. For the past three years, my wife and I have been watching our greater sulphur crested cockatoo slowly become naked from feather loss. First to go were the large quill feathers and more recently, down loss has left bald spots on his back and chest. We have visited the best vets in Chicago, New York, Richmond and our home town of Norfolk. In addition we have consulted by telephone with bird specialists in Boston and Washington D.C. No one was able to provide any solutions. The standard vitamins and hormones did not work.

Our bird's condition resembles a severe case of French moult but except for the feather loss, he is perfectly healthy. His blood count is normal, he eats well, is active, talks exceptionally well and despite his lack of feathers, has never had a cold. He was hand raised by my wife and I while I was teaching in Australia and imported with considerable trouble to the U.S. Naturally we are very fond of him. Most frustrating to us is that while veterinarians all agree that they can do nothing for our bird, none of them has the slightest idea of what he is suffering from. As aviculturists everywhere know, medical testing for birds is severely limited or non-existent.

I was somewhat familiar with the methods of spectral-analysis from science and nutrition magazines. When I saw an ad for hair analysis, I wrote with a proposal to run tests on feathers. I was very surprised to receive a prompt reply from Dr. Arthur Furman of A and A Laboratory in Washington D.C. (P.O. Box 55326, Zip Code 20022) who was interested and game to experiment.

There were problems however. Since there are no established norms for mineral levels in birds, a control was necessary. For this I chose my male moluccan cockatoo, a closely related bird who is extremely healthy and also on the same diet as my sulfur crested. Also, Dr. Furman's spectrascope is connected to a computer that gives an extremely complete printout of human mineral norms. The feather results also came out on the same printout which was somewhat distracting.

The results were rather unexpected. In all 18 mineral levels tested for, the sulfur crested had considerably higher levels than the moluccan. Among toxic minerals tested for, the level of aluminum showed to be 34 parts per million for the sulfur crested and no trace at all for the moluccan. Usual range for humans is between 2 and 10 parts per million. 34 parts per million is considered toxic for humans. While there are no known levels of toxicity for birds that I know of, given a bird's well know susceptibility to pollutants of all types, I think it is reasonable to conclude that 34 parts per million of aluminum is also a toxic level for birds. Also present at a toxic level was cadmium, although in a much smaller amount.

I traced my bird's source of poisoning to his cage. The interesting point here is that this particular birdcage is not an aluminum cage, it is galvanized steel. Checking with a local plating company I found that aluminum as well as cadmium is often used in the galvanizing process. Needless to say, this cage is no longer used and I now regard all galvanized cages as dangerous. There are also a number of anodized aluminum cages on the market and I would consider these cages to be extremely dangerous, especially for parrots that like to hang and swing from the wire. I do not know if my bird will ever recover his plumage but I will make certain that this never happens to any of my other birds.

In addition to the aluminum toxicity, the analysis showed several other things. The calcium to phosphorus ratio was normal for my moluccan but abnormal for my sulfur crested. Ideally, calcium to phosphorus should be in a 1.4 to 1 ratio. An imbalance can result in any number of critical bone or nervous afflictions, any of which can be fatal. I have since made dietary adjustments but for two birds who have the exact same diet I would have expected more similar results. Perhaps this is a result of the aluminum poisoning, I have no way of knowing at the present time.

But beyond the importance of my own birds, I believe that spectral analysis offers an important tool for understanding nutritional needs of birds and monitoring their diet. Too often we take great care to see to it that our birds get a 'good' diet without having the slightest idea of how that diet is being absorbed and metabolized by individual birds. Obviously, we must begin to establish mineral norms for individual species of birds. Perhaps in the future, some sort of central record keeping could be established. Once norms are established, it might be beneficial to compare mineral levels in wild populations with similar birds in captivity. There may well be certain mineral levels at which birds lay better and achieve better survival rates. Also, I expect that wild populations undergo seasonal changes in mineral levels that might advantageous to duplicate in captive species.

It is no longer necessary to proceed in aviculture on a trial and error basis. Spectral-analysis offers a scientific procedure that can be used to monitor the health of our birds. Rare stocks of birds are simply too important to raise in a haphazard manner. This will become especially important in the future when native stocks of birds become depleted and aviculture becomes even more essential to supply existing species and save threatened ones.