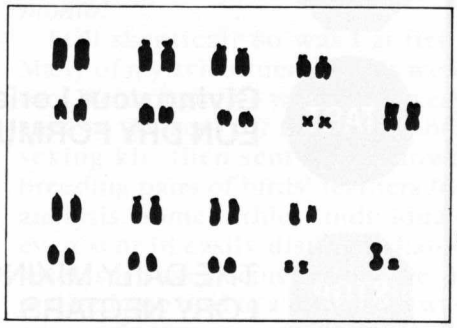
Feather Sexing — a logical alternative

by Joanne Abramson
Fort Bragg, California

In August of 1986, after the death of my second macaw (a hand-raised greenwing) to surgical sexing I searched for a better method. I had always used competent avian veterinarians; no pseudo, backyard breeders playing veterinarian for me. But after surgically sexing over thirty birds, my "luck" had run out. Now you must understand, breeders are a skeptical group of individuals who pride themselves on dependable methods. I am part of a network of breeders who believe in modern avian medicine. I was around before surgical sexing was available, when we never knew if our birds were the same sex or just incompatible. Surgical sexing revolutionized our lives. But progress has brought a new revolution, "feather sexing."

Chromosome analysis has been utilized for humans since the late 1960s. The objective in people is to determine if there are any genetic disorders and it is not done solely for the purpose of determining the sex of the child, although that is one of the test results. The technique in use for birds, more commonly known as "feather sexing," is relatively new. First discovered in 1980, we are using this test primarily to determine the sex, although it is very likely that, in the future, we will be equally interested in the genetic characteristics of the bird. The procedure costs $35 with discounts available if you send in over ten specimens during the same month. We are fortunate to have an easy access through the removal of a "live" feather. Aviculturists refer to these as "blood feathers" since they carry blood in through the shaft to keep the newly growing feather tissue alive. These new feathers contain tissue pulp made up of living cells which can be grown in a culture medium and after 7 to 14 days they are harvested to make a chromosome preparation. The chromosomes are then analyzed to determine the sex. Females have one Z and one W (ZW) sex chromosome and males have two Z (ZZ) sex chromosomes.

Sex Chromosomes of a Puerto Rican Amazon



From photo by Marc Valentine

Top Karyotype is a male (ZZ).

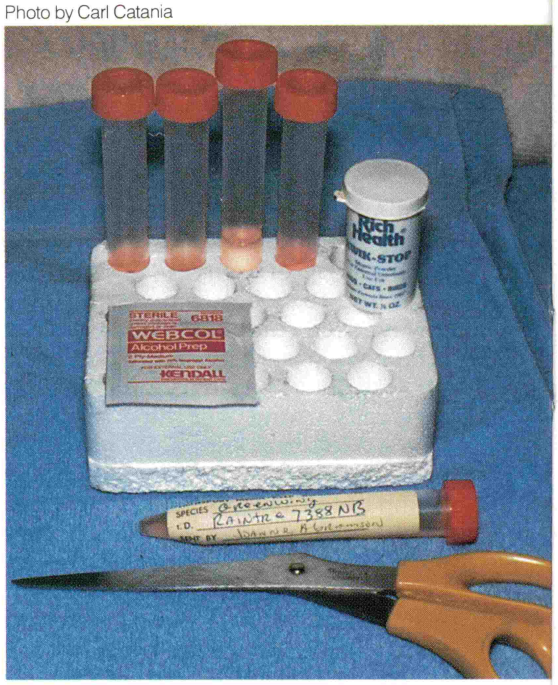
Bottom Karyotype is a female (ZW).

The sex chromosomes are at the bottom right of each Karyotype.

This method of sexing was pioneered by Marc Valentine. Marc's background is in zoology, with additional training in cytogenetics from M.D. Anderson Hospital in Houston.

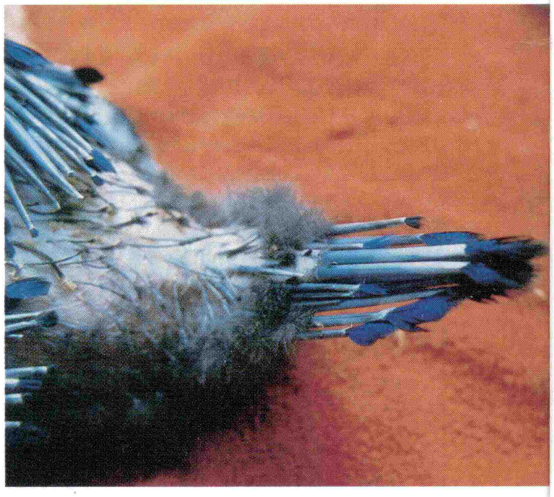
Continued on next page.

Photo by Carl Catania



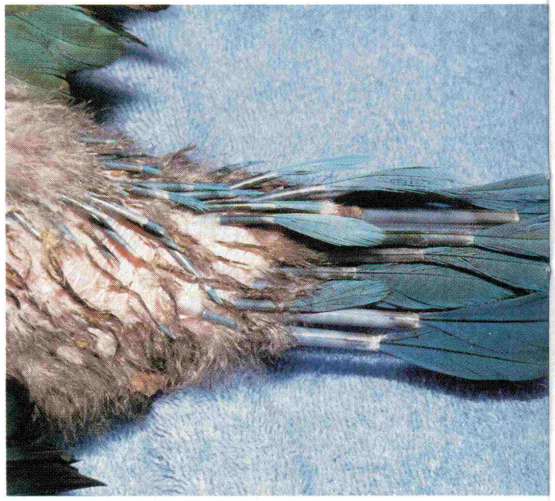
Feather sexing kit. A good pair of shears is necessary but are not included in the kit.

Photo by Keevan Abramson



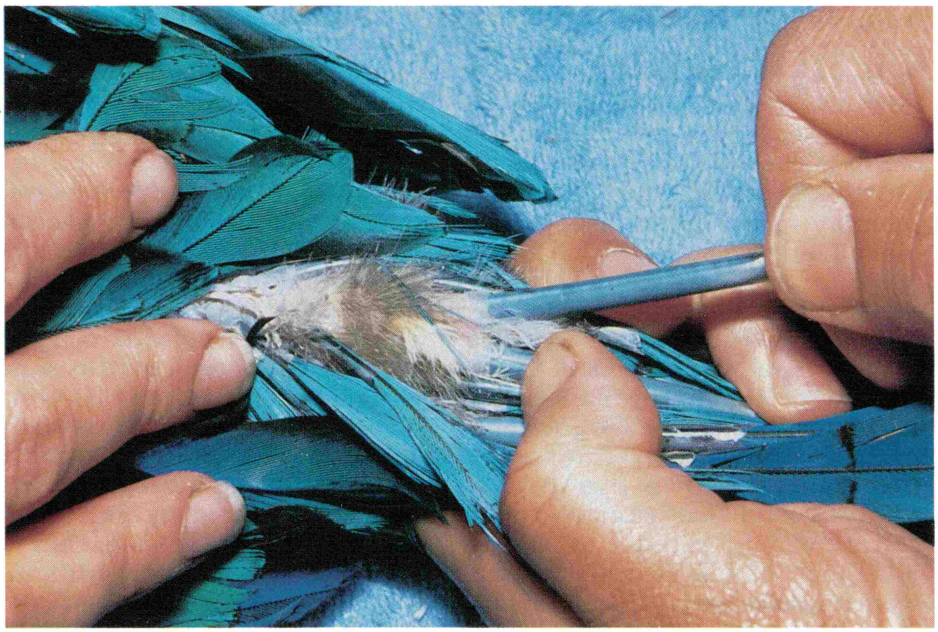
Hyacinth macaw 47 days old. At this young age, feather development presents only two good choices for feather sexing.

Photo by Carl Catania

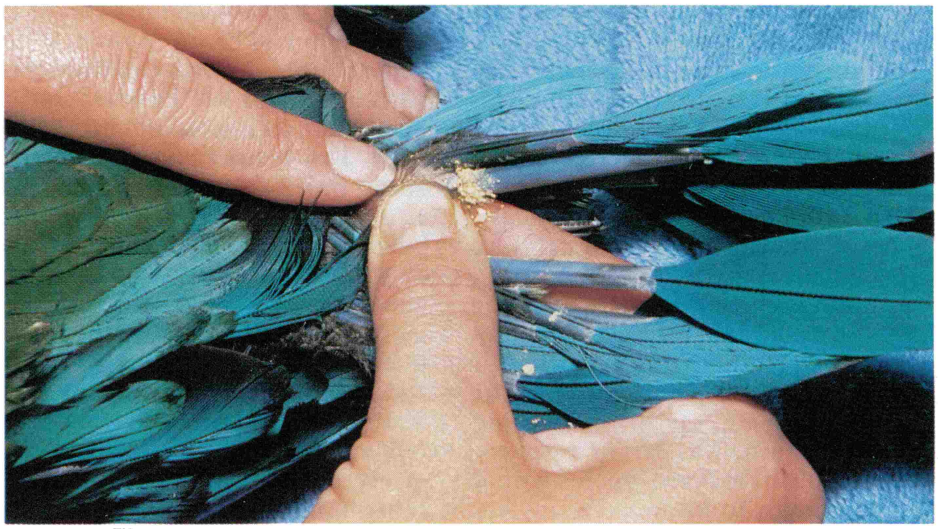


Green winged macaw 51 days old is far enough developed that any of these tail feathers can be used.

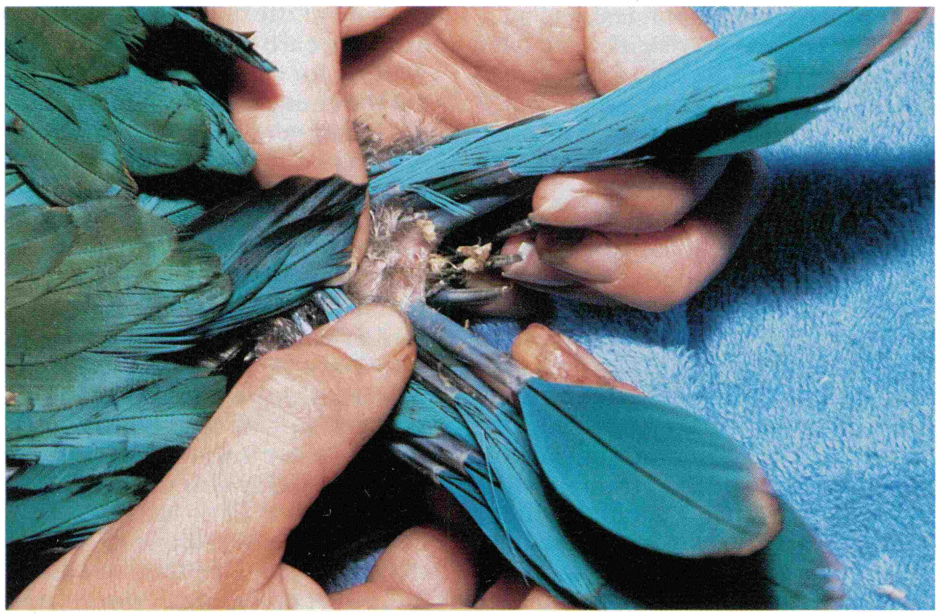
Photos by Carl Catania



A carefully selected specimen feather is ready to be pulled out.



Kwik Stop™ and pressure is immediately applied to the site of feather removal.



Close-up of empty folicle after blood feather is removed.

In 1980 he conducted an evolutionary study of touracos and decided to use comparative cytogenetics. As Marc puts it, "Bird sexing was a by-product of that study since I had to be able to get chromosomes from birds in a non-invasive manner." Marc is currently testing 200 to 300 birds *per month!*

Still skeptical? So was I at first. Many of my avicultural friends were too. We thought we were being very sneaky. We sent off for the feather sexing kit, then sent back known breeding pairs of birds' feathers for analysis. Some ruthless individuals even sent in easily distinguishable sexes, such as eclectus parrots. We all realized one bird in a test group was not much of a research study, so we sent off four or six feathers for analysis. And guess what? They were all correct. Now the chance of one feather being right is 50/50, but as multiple feathers are sent the chance of an incorrect answer from an inaccurately run test rises dramatically. As I talked to various breeders I found they had done the same thing and they had one hundred percent accuracy. In addition, many of them were

Live feather portion is cut off and placed in the transport medium.

using this technique on baby birds. Suffice to say I was sold. We now feather sex all new incoming breeder birds and all the babies in our nursery.

A little background about chromosomes might be helpful. Marc tells me birds have between 40 and 136 chromosomes, depending on the species. Since I only breed macaws, I asked Marc for information regarding whether he could see any chromosomal differences between the species of macaws. As Marc explains it: "Most macaw species are chromosomally indistinguishable. Blue and golds and canindes share a derived chromsome that is unique to these two species. The yellow collared macaw also has a feature which is unique to it. It is quite apparent that virtually any two macaw species can be hybridized successfully in captivity and produce fertile offspring. This is the expected result from a cytogenetic perspective because of the lack of chromosomal diversity within this group. Two species which can be successfully hybridized and also have numerous chromosomal differences from one another would be expected to produce sterile offspring such as in the case of the mule." Chromosomally, except for the before-mentioned species, all macaws are equivalent. A hyacinth is chromosomally the same as a Buffon's. If Marc were sent an unmarked feather from a hybrid (for example, a scarlet x blue and gold), he would be able to say that a blue and gold or caninde was part of the cross, but the other macaw species would be unknown to him.

Because this is a non-invasive procedure there are several advantages to this procedure over surgical sexing:

First, there is no risk of death from anesthesia since no anesthetic is necessary.

Second, there is no risk of post-operative infection or potential scar tissue from the surgical site.

Third, there is the ability to accurately determine the sex of a bird at an early age. (The youngest bird we have successfully sexed to date is a 41-day-old hyacinth macaw. The tail feather used for the sexing was barely two inches long. By the time that bird was two months old we knew the sex. *Surgical* sexing techniques at this young age are both extremely risky and of questionable accuracy due to the lack of early sexual manifestations of the overy and the testis.)

Fourth, in addition to the ability to find out the sex of your bird, it is possible to determine chromosomal abnormalities which could indicate reduced fertility or sterility. Any bird, young or old, can be tested. All you need is the kit and a live blood feather.

Fifth, because the procedure is done at your own home, you decide how many birds to have sexed at any time. You don't have to jeopardize your birds at "group" surgical sexings with the very real potential complications of exposure to viruses and bacterial infections.

The collection technique is a rather simple one. You will need to contact the Avian Genetic Sexing Lab and let them know how many birds you are interested in feather sexing. They will send you a styrofoam container which you will open on arrival. In the box will be a cold pack that you will need to freeze and as many tissue containers as you requested for your feathers. These transport containers have a special broth in them which keeps the tissue alive until Marc gets it to the lab and the containers will need to be refrigerated until they are used. This medium has a shelf life of about one month. One feather is all you will need for any of the macaws, but some of the smaller species, such as caiques or small Amazons, may need two feathers. A complete list of instructions will accompany the kit. Before you send for the kit, you should make sure you have blood feathers on the birds you want to sex. In a large bird like a macaw, there is rarely a time that there isn't a tail or wing feather being replaced. But should this be the one time, you can create a new blood feather by pulling out one of the dead feathers (like the kind they are always discarding) and waiting for a new feather to grow in. On the young babies, all their feathers are brand new, so it is just a matter of waiting until they are long enough to have sufficient tissue for analysis. On the large macaws this occurs when they are about six weeks old. It is helpful to have someone assist you when you do the collecting of the feather sample.

1. Have all your supplies laid out on a clean, stable surface. In addition to the supplies in the kit you will need to have scissors and alcohol pads. A towel is also helpful to place the bird on.

2. Clean your scissors with the alcohol pad and place them on a clean surface. A clean towel works well.

3. Locate the appropriate blood feather. It is easier if one person holds the bird and one person pulls the feather. Hold the feather firmly, but do not squeeze the tissue out, and pull the feather out in one swift, smooth motion. If bleeding occurs from the site, the bird handler can apply pressure to the site until it stops. We feel more comfortable having "Kwik Stop" available, just in case.

4. Uncap the biopsy container and place the shaft portion of the feather in the biopsy container. Cut the feather just slightly below the dead part to insure as much tissue as possible.

5. Label the bottle with the bird's I.D. number (band number, hatch date, or name) along with the species and the date you collected the feather.

The feathers are then packed into the styrofoam container with the now frozen cold pack on top of them. The remainder of the container is then filled with the same newspaper that came with it to prevent movement of the biopsy containers. The specimens have to be shipped back to the laboratory as quickly as possible. In most large cities this can be done with an overnight mail service through your post office. In our case, since we are in a rural environment, the only way we can get it to the lab in the specified 24 hours is by Federal Express. If you have to use Federal Express you should plan to contact them ahead of time to make arrangements for them to pick up your package. They will come right to your door in most locations. Some avian veterinarians are offering to do the feather collection for you in their office, so check with your veterinarian.

This method allows breeders to decide which birds to retain for their own breeding programs and which should be traded or sold. By feather sexing all of your young birds, unrelated pairs can also be matched up, providing future breeding pairs.

Conclusion

The combination of an accurate, medically safe, early sexing technique with the benefits of evaluating potentially, though unlikely, chromosome disorders makes feather sexing a valuable tool for aviculturists.

For further information contact Marc Valentine, Avian Genetic Sexing Laboratory, 3148 Guernsey, Memphis, Tennessee 38112. Phone (901) 323-4045. ●