Psittacine Beak & Feather Disease
will one of your birds die next?

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If you have endured the helplessness of having a bird diagnosed with Psittacine Beak and Feather Disease (PBFD), we are sure you will understand the degree of pain and suffering represented by the photographs you see in this article. If you maintain susceptible species of psittacine birds and have not yet been plagued by this disease, be patient! Sooner or later you may experience an outbreak. You may be lucky, and the PBFD virus will only destroy one of your cherished pets. You may, on the other hand, be unlucky and the virus may infect an entire nursery of young psittacine birds. Some choice! We must reach a point where we can control this disease in the same manner in which we prevent distemper, parvovirus and rabies in our dogs and cats. Aviculture needs an effective vaccine for the PBFD virus.

It was in the mid-1970s that a slowly debilitating disease was first described in Old World and South Pacific psittacine birds. The syndrome was identified by varying degrees of symmetric feather malformation and loss, development of beak deformities and, usually, death. Through the last decade, this disease has been given many names, including cockatoo beak and feather disease, beak rot, fungal dermatitis, cockatoo feather picking syndrome, molt disease, feather maturation syndrome, adrenal insufficiency, thyroid insufficiency and French molt. All of these names describe characteristics which have been associated with the disease. Since the syndrome has been diagnosed in numerous psittacine species in addition to cockatoos, the currently accepted name for the syndrome is psittacine beak and feather disease. In Australia, French molt and PBFD have been shown to be caused by the same virus, while in the United States they are currently thought to be two distinct diseases, caused by two different viruses.

What birds are most at risk for PBFD?

Citron Cockatoo  
(C. citrinocristata)  
Blue-fronted Amazon  
(Amazona aestiva)  
Vasa Parrot  
(Coracopsis vasa)  
Senegal Parrot  
(Poicephalus senegalus)  
Meyer's Parrot  
(P. meyeri)

As indicated by this list, the disease is certainly not limited to cockatoos, and is a problem that all of aviculture must address. Interestingly, PBFD has not been diagnosed in non-psittacine species. Unfortunately, the virus appears to be expanding its host range and is being reported in species of psittacine birds that were once thought to be resistant to the disease. Several years ago, bird owners were told they did not need to be concerned about PBFD in New World species. There is now documentation of the virus in several Amazon parrots. Obviously, the exclusion of New World species as susceptible hosts was incorrect and the actual host range of the virus that causes PBFD remains largely unknown. With the widespread global movement of birds for the pet market, the potential for introducing the highly virulent PBFD virus into wild populations of the world’s more endangered psittacine species is a very real possibility.

What age birds can develop PBFD?

Clinical signs consistent with PBFD often appear in young birds with the first feather formation after replacement of the neonatal down, and neonates as young as two months of age have been described with classic lesions! While PBFD is reported most commonly in birds less than three years of age, the disease can also develop in older adult birds that have previously shown no signs of feather abnormalities. We have seen many birds that were more than 10 years old before they developed any signs of PBFD.

How often is this disease seen in the wild?

The disease has been reported in wild populations of Sulphur-crested Cockatoos, Galahs, Little Corellas, Major Mitchell’s Cockatoos, Budgerigars, and Rainbow Lorikeets. In any one year, up to 20% of wild Sulphur-crested Cockatoos have been found to have clinical signs of PBFD. Although not documented, there is...
also frequent discussion of clinical changes consistent with PBFD occurring in wild populations of Moluccan cockatoos, Philippine Red-vented Cockatoos, lovebirds, Umbrella Cockatoos and Citron Cockatoos. While numerous white and pink cockatoo species are included in the reported list of susceptible birds, we have only recently recovered the PBFD virus from a Black Palm Cockatoo. The documentation of the disease in this bird further expands the potential host range of the virus. No bird can be considered safe from the highly infectious PBFD virus until we have an effective vaccination program and can eradicate this disease.

How is the disease recognized?
PBFD has been recognized as having both acute and chronic clinical syndromes, and disease progression varies markedly. Some birds die shortly after showing the first indication of malformed feathers; others may live for several years in a featherless state. Typically, the first signs of PBFD involve the replacement of normal powder down and contour feathers with diseased, non-viable feathers that stop growing shortly after emerging from the follicle.

Except for reported recoveries in budgies, lorikeets and lovebirds, PBFD is considered fatal! Most infected birds survive less than six months to one year after the onset of clinical signs, and usually die from secondary bacterial, fungal or other viral invaders.

Most pictures of featherless birds illustrate the chronic form of PBFD which has progressed for years. A more rapid form of the disease, with only minimal feather changes, can occur in young birds. This acute form of the disease is characterized by depression, anorexia, crop stasis, diarrhea and death. Neonates that survive the acute form of the disease develop classic feather lesions as they mature. The disease progresses during the ensuing molts to a point where the flight and tail feathers may also be diseased.

How is the disease diagnosed?
PBFD should be suspected in any psittacine bird with progressive feather loss in which malformed feathers can be identified. A positive diagnosis requires the identification of viral induced inclusion bodies in diseased tissues, following specialized staining and microscopic examination. While we now have methods for detecting antibodies against the virus, we do not know whether birds with these antibodies are protected or if they will develop PBFD in the future. Understanding this part of the disease will require further work.

What causes PBFD?
Historically, the reported causes of PBFD were numerous and included adrenal insufficiency, hypothyroidism, fungal infections, bacterial infections, environmental toxins, nutritional deficiencies and shipping stress. Due to the accomplishments of disease investigators both in Australia and the United States, we have now recovered the specific, highly infectious virus that is responsible for causing PBFD.

What is a virus?
Viruses are a group of microorganisms that must live inside the cells of a living being in order to replicate and produce new viral particles. This requirement of living tissue in order to grow is the main characteristic.
which separates viruses from all other microorganisms, such as bacteria and fungi, which can live on dead material.

The requirement of living cellular material for reproduction also makes viruses extremely difficult to treat. Typically, any agent that is toxic to the virus will also be toxic to the host cell in which the virus grows. This is why many viral diseases, including PBFD, are considered untreatable. The only way to stop these viral diseases is to prevent them from infecting cells by use of appropriate vaccines.

Why don’t all animals that get a virus die?

When viruses enter an animal host, they can have several effects on that animal:

1) The virus can induce an effective immune response. This results in blood components (antibodies and special cells) that help destroy the virus and also act to protect the animal from future infections with the same type virus. This type of response is the reason a person has measles only one time. The body responds to the infection, destroys the virus, and is protected from future infections by the same virus.

2) A virus may enter the host in such a way that the immune response is too slow or is insufficient to stop the progression of the virus. This often results in the death of the host. This is the type of reaction that occurs with the rabies virus. The body does not mount an effective immune response, and the animal dies.

3) Viruses can also enter a host and cause a long-term active infection. In this case, the virus may either damage the immune system or, by several mechanisms, protect itself from immune system components. It may be by this mechanism that PBFD virus functions. A similar mechanism is also employed by the virus that causes AIDS in humans. Viruses that produce chronic infections, like PBFD, pose the greatest threat to other animals, since the virus is being constantly shed into the environment where it can infect other hosts.

4) Animals infected with some viruses may become carriers, and while they may appear clinically normal, they will shed large quantities of virus into the environment. A carrier state is responsible for many of the Papovavirus outbreaks that cause devastating losses in psittacine nurs-
niques. The microscopic structure, protein composition and type of nucleic acid the virus contained were then examined. When these components are jointly examined, they can be viewed as the “fingerprint” of the virus. These parameters were then used to compare the PBFD virus with other known viruses. These investigations revealed that the PBFD virus was a 12 to 16 nanometer non-enveloped virus with a single stranded circular DNA genome. These characteristics were unlike any of the other viruses currently known to cause disease in animals. From a scientific standpoint, PBFD virus is extremely interesting because it represents an entirely new family of pathogenic animal viruses. We used to know of 21 families of animal viruses, now we know of 22.

How contagious is the PBFD virus?
The PBFD is extremely contagious, particularly to young birds. PBFD-positive birds should definitely not be maintained where exposure can occur to psittacine neonates or to endangered species. Exposure of neonates to the virus in the nursery can cause most devastating losses. We have investigated nursery outbreaks where up to 40 cockatoo babies have developed PBFD from a single exposure source.

Although the disease is most common in young birds, older birds are not necessarily safe from the virus. There is nothing magical about birds attaining the age of three. We have worked with several birds that had no signs of PBFD until 10, 15 or 20 years of age. No bird will be safe from the PBFD virus until we have an effective vaccine.

How is the virus transmitted?
We know the virus is present in diseased feathers. With the high viral concentrations in infected feather follicles, it is likely that the virus can be transmitted by preening activities or by ingestion of feather dust. We have also recovered PBFD virus from the feces of infected birds, indicating the potential for viral transmission through contact with contaminated feces. Several reports indicate the possibility of clinically normal adults producing neonates with clinical signs of PBFD in successive breeding seasons. This finding suggests that a carrier-state may exist, in which an apparently normal parent transmits PBFD virus to offspring. In most cases of suspected parent to offspring transmission, investigations indicate probable exposure to the PBFD virus through sources other than the parents.

How long can the virus remain infective?
Some viruses can live for long periods in the environment, while other viruses can live only minutes outside the host. Typically, it is the presence of a lipoprotein envelope which surrounds some viruses that determines how long the virus can persist in the environment. Viruses that have an envelope usually do not survive long outside the host and are sensitive to most disinfectants. Viruses that do not have an envelope tend to be more stable in the environment and are resistant to many disinfectants. Unfortunately, PBFD virus does not have an envelope, and is probably very stable in the environment, resistant to many disinfectants and can remain infective for long periods of time.

How can I protect my birds from this disease?
Currently, there is no effective therapy for PBFD, and, because it is
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caused by a virus, no effective cure should be expected. Since treatment of an infected bird is not an option, there are only two other ways to protect our birds from viral infections. The first way is to totally prevent any contact from occurring between a bird and the virus. While this concept is simple in theory, it is completely impossible in application. Viruses are extremely small, and can travel great distances in dust, in tears, in hair or on clothing. The second method of protecting our birds from a viral infection is through the use of vaccines that allow the animals to develop protective antibodies. These antibodies are a defense system that stops the virus from attacking the cell. Since the PBFD virus is widespread, totally preventing exposure to the virus would be extremely difficult. Thus, to ensure that our birds are protected from the disease requires the development and use of an effective vaccine. Think, for example, about trying to protect your dog from parvovirus without a vaccine, and you will understand how difficult it is to protect your birds from the PBFD virus without a vaccine.

Until we have such a vaccine, there are several things you can do to reduce, but not eliminate, the chances of your birds developing PBFD. The key to these suggestions is: reduce exposure. Never have neonates in contact with any bird that has feather lesions. Do not expose your birds to any imported cockatoos. Always avoid contact between birds from different collections and do not mix neonates from several sources in the psittacine nursery. Since PBFD is caused by a virus that can be shed into the environment and may survive for prolonged periods, it is not a good idea to maintain PBFD-positive birds in aviary collections, particularly where there are psittacine nurseries or where endangered species may be exposed.

What’s next with the PBFD virus?

It is true that the disease was first recognized in the early 1970s, and it has taken some 15 years to reach our rudimentary understanding of the PBFD virus. This unfortunate situation has occurred due to a lack of funding for avian research. Primary health investigations into animal diseases are extremely expensive, and only aviculturists and others interested in birds can be counted on to fund the necessary research to eradicate PBFD and other avian diseases.

Were it not for the dedicated individuals and organizations listed below, we would not have been able to complete our current level of work.

With appropriate funding, our next phase of investigations will be to develop and test a vaccine for this highly infectious virus before it destroys more of our prized avian species and before it further extends its range to new species as it currently appears to be doing. This effort will require the involvement of every individual and organization interested in avian health and the future propagation of psittacine birds, both in the wild and in captivity.

PBFD Virus Summary

1. PBFD, like other viral induced diseases, is presently untreatable.
2. PBFD is currently known to occur in some 30 species of birds.
3. PBFD virus is spreading to new species of psittacine birds.
4. Both young and old birds can develop PBFD.
5. PBFD virus is a member of an entirely new family of viruses.
6. The PBFD virus may be transmitted through feathers or feces.
7. The PBFD virus is probably stable in the environment for long periods.
8. The PBFD virus is highly infectious, particularly to young birds.
9. No bird will be safe from PBFD until we have an effective vaccine!

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These 14-week-old African Grey Parrots have deformed powderdown and contour feathers that are consistent with PBFD. The source of the virus that infected these babies is undetermined but all 14 neonates that were in the nursery at the time of the outbreak developed PBFD.

References