AGING IN MACAWS

Susan L. Clubb, DVM*
Lorraine Karpinski, VMD, Dip ACVO**
*Parrot Jungle and Gardens
11,000 SW 57 Avenue
Miami, Florida 33156 USA
**South Dade Animal Hospital
6380 South Dixie Highway
Miami, Florida 33143 USA

ABSTRACT

Macaws are noted for being hardy and long-lived. Estimates of their natural life span are often quoted as 60 years or longer. In actuality, little documented evidence of the life span or aging process of macaws exists in the literature. This review of health records on a group of known age macaws provides some insight into the aging process and longevity of macaws in captivity and may assist in understanding population dynamics in wild macaw populations.

Parrot Jungle and Gardens in Miami, Florida, was founded in 1936 as a tourist attraction featuring parrots in a jungle hammock setting. Free-flying parrots, especially macaws, were the leading attraction. These birds were kept for ornamental and entertainment purposes, and breeding was a secondary consideration. Nonetheless if birds chose to breed they were allowed to do so and a breeding facility was provided. Many of the birds that hatched at Parrot Jungle in the early years have remained at the park for their entire lives, making a study of their aging possible.

In order to document some of the clinical aspects of aging in macaws, 57 birds known or estimated to be in excess of 25 years old were examined yearly for three years. Of these, 26 were captive-bred and ranged in ages from 25 to 52 years old. Thirty-one (31) were wild caught birds which had been in residence at Parrot Jungle and Gardens for 20 years or longer.

The oldest bird at Parrot Jungle, a Military Macaw, was recently euthanized due to frequent and severe seizure activity. This bird was one of the original birds imported in 1936 for the opening of the park and was, therefore, at least 57 years old. This bird, however, had been blind and had a chronic neurologic disorder for many years. The onset of these disabilities was not recorded. Histopathologic examination of the brain revealed mesencephalic tectal neuronal atrophy affecting neurons of all strata, neuronal lipofuscinosis of the cerebellar nucleus, medulla oblongata and some mesencephalic nuclei, focal calcinosis of the ventral region of the medulla oblongata, and aortic and pulmonary arteriosclerosis. Neuronal lipofuscinosis is a common finding in aged birds and mammals.1

The first macaw hatched at Parrot Jungle is still in the collection and is now 52 years old. His sibling died at age 49. Seven captive-bred birds in the collection are known to be between 41 and 48 years old. All of these birds have cataracts that have reduced or obscured vision. Most also show degenerative diseases associated with advanced age, including joint stiffness (suggestive of arthritic changes), loss of skin tone and elasticity, muscle wasting, and degenerative neurological disease.

General Appearance

As in aged individuals of mammalian species, aged macaws show physical degeneration that progresses with age, becoming evident roughly at the time that their reproductive potential is exceeded. In a previous report the reproductive life span of macaws at Parrot Jungle and Gardens was documented.2 In this population macaws produced offspring from approximately four to 35 years of age. The most productive years were the late teens and early twenties.

While all degenerative changes were variable in age of onset, in general, muscle wasting and weight loss was evident in most individuals after approximately 40 years of age. In this collection some of

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this muscle wastage could be related to lack of exercise, as older birds were retired and remained relatively sedentary. Older birds, however, often voluntarily, or by physical necessity, became sedentary and placid. For example, some older birds that had been free-fliers would often revert to primarily walking, or resting in a familiar and secure location for most of the day.

Postural changes were not dramatic. Most birds remained erect when perching unless they had previous skeletal injuries. Joint stiffness or limitation of the range of motion in the joints, especially the hocks, is typically evident in birds in excess of 40 years old. It is not known if arthritic changes are associated with this joint stiffness. Several birds in excess of 40 developed twisting deformities of the carpi in which the primary flight feathers twist laterally, similar to helicopter wing deformity of poultry.

Dermatological changes are evident in the skin of the face and feet. Pigment spots, polyps, wart-like blemishes, cysts, and wrinkling are all evident in the facial skin. Thinning of the skin is especially evident in both the facial skin and skin of the feet in birds exceeding 40 years of age. Spotty depigmentation of the skin of the feet was common. Aged Blue and Gold and Green-winged Macaws often showed thinning of the feathers of the facial lines. Feather pigmentation was typically unaffected although feather condition and luster often declined in birds in their mid to late forties.

Degenerative ophthalmic disorders, primarily cataracts, were evident in most macaws in excess of 35 years. Ophthalmic changes include changes in external ocular appearance. Most obvious externally was lid laxity. Lids lost tone, became thickened and somewhat wrinkled. In this collection some birds had old lid injuries from fighting. Changes for the most part were not clinically significant.

The corneas remained relatively clear unless there had been some interocular involvement or trauma. Isolated aging changes of the cornea were not apparent. Of those corneas that were not clear, previous or chronic active uveitis or trauma contributed significantly to corneal opacification due to crystallization or edema. Attempts at clearing these corneas medically failed. Corneal changes in some birds precluded examination of intraocular structures.

Iris color is frequently relied upon in estimating the age of macaws. The irides of a mature macaw (most *Ara* Sp.) are deep yellow. Iris atrophy as seen in these older birds was evident as a darkening of the normally light colored iris. This color change results from loss of the iris stroma over the posterior pigment epithelium allowing its natural dark color to be seen as a dark ring through the iris stroma. In the absence of uveitis the iris typically retains its voluntary contractile capability. This is in contrast to domestic mammals who with age traditionally lose the integrity of the iris border, including the sphincter muscle, and therefore, the eyes ability to constrict the pupil.

The lenses often show nuclear sclerosis, a normal aging phenomenon in all species, which appears as a pearlization of the center of the lens. Additionally, most older birds developed true cataractous changes of their lenses. Cataracts, true opacities of the lens, initially appeared as opaque striation in the lens cortex. For this study, cataracts were classified as immature if they were incomplete and allowed visualization of the posterior pole of the eye. Immature cataracts were evident in at least one eye in most birds over 35. In many birds cataracts remained incomplete and the birds remained visual for several years after the age of onset. Interestingly, the change from incomplete involvement to complete and mature cataract formation was often rapid without detection of a complete immature cataract stage. Those birds with rapidly developing cataracts often developed phacogenic uveitis, which if left untreated results in blindness. Most of the birds that were 45 or older were blind in at least one eye, probably due to phacogenic uveitis. The pectins and the retinas when visible appeared grossly normal.

Cataract surgery was done in 13 eyes of eight birds. These birds were selected for surgery because of functional visual impairment or because they had uveitis as a result of rapid cataract progression. Five of these birds had bilateral surgery.
No attempt was made to dilate the pupil prior to surgery. The instrumentation for phacoemulsification proved to be too large for the macaw eye. Through a corneal incision the anterior lens capsule was needled. The lens material was broken down and flushed from the eye with lactated Ringer’s solution. The corneal incision was closed with one or two interrupted sutures of non-absorbable material. Surgical complications included sloughing of the corneal epithelium, synechiation of the iris, and intrasurgical hemorrhage.

Postoperative inflammation was minimal in most cases. Birds were treated with topical application of dexamethasone/antibiotic preparation, followed by weekly subconjunctival administration of triamcinolone as needed (Maxitrol ophthalmic ointment, Alcon Laboratories, Fort Worth, TX; Vetalog, Solvay Animal Health). Treatment rarely exceeded four weeks.

Ten of the 13 eyes were visual on post-surgical exam. One bird had bilateral pupillary occlusion caused by posterior synechia and pigment migration across capsule membranes. Fibrous capsule remnants often caused partial occlusion of the pupil; however, birds were visual. The third nonvisual eye appeared to be related to a pre-existing intraocular inflammation which caused a dramatic change in the consistency of the lens material. In that eye, irrigation of the lens capsule contents was hampered by the stickiness of that material, and probably resulted in intraocular retention of lens protein, which is highly antigenic.

During the three-year study, 15 birds older than 30 died. Causes of death included euthanasia due to frequent and severe seizure activity (1), stroke (2), neoplasia (2), bleeding disorder of unknown etiology (1), atherosclerosis and trauma (1), aspergillosis (1), candidiasis (1), pneumonia (1), chronic liver disease (1), pulmonary sarcocystosis (1), chronic heart disease (2) and chronic kidney disease (1).

**Conclusion**

Macaws are long-lived birds and have few natural predators. They provide parental care for their young for a period of at least four months, making it unlikely that they would raise multiple clutches of chicks annually in the wild unless the first clutch was lost. Reports on the reproductive success of wild macaws indicate that they may not breed every year and often rear only a single chick.3 Theoretically, species which have a low reproductive rate can maintain stable populations if they have a long reproductive life span.

Observations of flee-flying macaws at Parrot Jungle and Gardens have revealed some aspects of macaw behavior that may provide insight into the biology of wild macaws, including reproductive life span and the clinical effects of aging.

The most consistent and potentially debilitating aspect of aging in macaws is cataract formation. The onset of immature cataracts in the mid to late 30s likely limits survivability in the wild. Interestingly, in most birds, the onset of cataract formation follows shortly after the decline of reproductive potential. The onset of arthritic and postural changes which are often evident in birds in their 40s further reduces survivability.

Macaws have few natural predators as evidenced by their gaudy plumage and raucous behavior. Habitation in the forest canopy makes macaws susceptible to few predators other than large birds of prey. The effects of aging may be important in limiting the life span of wild as well as captive macaws.

**References**
