

The Aracaris

Josef Lindholm, III
Senior Aviculturist,
The Dallas World Aquarium

While obviously closely related, the ten (or eleven) species that make up the Aracari genus *Pteroglossus*, exhibit a remarkable series of distinctive variations that could be called “genetic fireworks”. Among these small toucans there appears to be a “mix and match” array of vivid details: Beak patterns, eye color, skin patches, and highly contrasting bands of red or black feathers. It is theorized that the contraction and expansion of areas of tropical forest over time, as well as the formations of mountains and rivers repeatedly isolated populations of Aracaris, resulting each time in genetic drift and the establishment of distinctive phenotypes (Short & Horne, 2001)

These species are distributed essentially throughout the tropical New World mainland, from the Mexican States of Veracruz and Puebla, south through Central and South America, to Northern Paraguay and Argentina. Some have rather enormous ranges. Most have rather extensive ones spanning a number of countries. Only one full species has a highly restricted range. A number of subspecies occur in fairly small geographical areas.

All of the aracaris are dependent on forests. All nest in tree trunks, and all are primarily fruit eaters. While none are considered threatened with extinction, severe habitat loss has definitely occurred within the range of several species due to deforestation.

Avicultural History

All species of aracaris have been kept in captivity. The earliest reference I have come across is of Pale-mandibled (Ecuadorian Collared) Aracaris “shown for the first time at the National Exhibition in London in 1859” (Norris, 1977). The London Zoo acquired its first Aracaris in 1870, a pair of Collared Aracaris from Panama (Sclater, 1883), and from 1872 through 1880 obtained five Black-necked Aracaris, all from Brazil. Through 1927, London Zoo procured only one further species, the Letter-billed Aracari (Low, 1929). The National Zoological Park, in Washington DC, obtained its first species of Aracari, the Green, in 1932 (Tongren, 1989). The Red-necked Aracari first arrived at the National Zoo in 1935, the Black-necked and the Collared in 1941, the Chestnut-eared in 1961. and the Curl-crest in 1963.

The first Curl-crested Aracari recorded in aviculture was acquired in 1960 (Norris, 1977). This specimen was purchased from a Miami Dealer by the Bronx Zoo (which maintained an encyclopedic series of toucans from the 1930’s into the 1960’s). Within several years Curl-crests were obtained by a number of zoos in the U.S. and Europe. The early 1960’s was a time when a wide variety of aracaris were available to zoos and

aviculturists, and were (by today's standards) shockingly inexpensive, usually costing less than thirty dollars. This was due to an enormous volume of commercial air shipments out of Central and South America. Some places collected them like stamps. The San Diego Zoo inventoried five taxa of *Pteroglossus* on 31 December, 1969.

No captive breeding of any species of *Pteroglossus* took place until 1974, when the Los Angeles Zoo bred Pale-mandibled Aracaris (Lindholm, 2005, Rundel, 1976). By then, the availability of Aracaris had been drastically reduced. In 1967 Brazil prohibited commercial export of birds. Red-necked and Letter-billed Aracaris, which till then had been commonplace in collections, became unobtainable. All imports of toucans into the U.S. ceased for a time when the U.S. Newcastle's Disease import restrictions were put into effect in 1972. When imports were allowed again, it was only through quarantine stations, driving up the costs of birds dramatically. Around this time, exports from Costa Rica and Colombia were banned, and those from Peru and Ecuador sharply curtailed. The motivation towards successful propagation of toucans in the U.S. (which only commenced in 1970, when the Los Angeles Zoo bred Crimson-rumped Toucanets (*Aulacorhynchus haematopygus*) Lindholm, 2005) was thus greatly increased.

After regular shipments of South American birds to the United States resumed in the mid 1970's, birds from Guyana (and eventually its neighbor Surinam) were imported in numbers. Many of these species had previously been very rare in American aviculture. The Sun Conure is a case in point. Other former rarities which began showing up in some numbers included Hawk-headed Parrots, Turquoise Tanagers, Red-billed and Channel-billed Toucans, and Green Aracaris. A great many aviculturists and zoo people, myself included, got their first look at these species in the late '70's. Black-necked Aracaris began showing up in the 1980's. By the late '80's Greens and Black-necks were the most frequently available Aracaris in the U.S.. The importation of these two species ended abruptly in 1993 when the U.S. Wild Bird Conservation Act went in to effect, banning the commercial import of most birds included on any appendix of the Convention on International Trade in Endangered Species (CITES). Black-necked and Green Aracaris are both listed as CITES appendix II (which means only that any international trade in the given species be conducted by permit). Since then, the only species of aracari brought in on a purely commercial basis have been Collared Aracaris from Nicaragua. As of 2006, the general impression has been that Nicaraguan exports will soon cease.

In recent years aracaris have arrived in the U.S. under special circumstances, from places where commercial export is not permitted. The Dallas World Aquarium currently maintains nine species and subspecies of aracaris. In collaboration with the Venezuelan government agency, PROFAUNA, and FUNZPA (Venezuela's National Foundation of Zoological Parks and Aquariums) The Dallas World Aquarium has imported Green, Ivory-billed, and Many-banded Aracaris, and has also acquired Chestnut-eared Aracaris through the cooperation of the Brazilian agency IBAMA.

While Peru allows limited commercial export of certain species, primarily small passerines, most birds from Amazonian Peru are not included in this quota. Jerry Jennings has been allowed to export several species from this area, mostly established at

his Emerald Forest Bird Gardens, with a number going to other collections for breeding purposes.

In the meantime, the member institutions of the AZA (Association of Zoos and Aquariums) have concentrated on the propagation of the Green Aracari, with remarkable results. The efforts of private aviculturists to establish Collared Aracaris also look promising.

Captive maintenance

Ideally, aracaris intended for breeding projects should be maintained as pairs by themselves.

Aracaris maintained for breeding purposes definitely prefer being able to look down on their humans, but cage height itself is not a necessity. A pair of Green Aracaris at The Dallas World Aquarium are, as I write, raising chicks in an aviary four feet tall, four feet wide, and twenty feet long, built eight feet above a service area. Space for horizontal flight is important. (As Jean Delacour observed, regarding the tall, cylindrical cages that were popular in zoos in the '60's and '70's: "Birds don't fly up and down, they fly back and forth".) The majority of The Dallas World Aquarium off-exhibit ramphastid aviaries are twelve feet tall, four feet wide, and sixteen or twenty feet from front to back. The aviary's ceiling should be several feet above the top of the door frame, thus significantly reducing the danger of escapes through the door. With adequate space above an intruder's head, aracaris are much less likely to panic when their aviary is entered, and instead often ignore any non-food related procedure.

In outdoor situations protection from heavy rain is a necessity. All members of the toucan family are easily drenched (which expedites recaptures of escaped birds when hoses are available). Once wet, they are prone to hypothermia in temperatures below 60F, and can quickly die. Night-time rainstorms can be particularly dangerous. When logs are provided, most aracaris will retreat to them as it gets dark. At the same time, there should always be a covered part of the aviary roof, or a shelter.

At temperatures below 60F, there should always be a heat source: a heat lamp or heater, or, as in the cases of The Dallas World Aquarium, heated air from vents. With a such supplementary heat available, and an area where birds can remain dry, temperatures above freezing are generally tolerated. Aracaris should not be exposed to below freezing temperatures. At The Dallas World Aquarium, the off-exhibit outdoor aviary complexes are completely enclosed in plastic sheeting from late fall through mid spring. Care must be taken, that under such conditions, sunny days do not cause dangerous rise in temperatures.

Temperatures above the high 80'sF can be very dangerous. Not only is shade essential, but a misting system is highly recommended. Under supervision, a shower or "rain" system is very useful in hot weather. On the other hand, aracaris are fond of the sun. Their prolonged and exaggerated sun-bathing can be truly alarming to see, if not

recognized for what it is. With beak agape, wings thrown out, head turned upside down, and a generally prostrate appearance, especially when on a shelf or other level surface, a sunbathing aracari may present an excellent impression of having suffered an especially horrible death – only to jump up and look perfectly normal when a door is flung open or involuntary exclamation uttered.

Solid floors, which can be easily hosed, of course maximize sanitation. However aracaris look wonderful in planted aviaries, and benefit from the shade, partial concealment, varying perches, and enrichment opportunities that living plants provide. Excellent results in propagation and long term management are routinely achieved in such environments. It is wise to collect fecal samples for parasite detection at regular intervals. Occasional soil replacement is recommended, and is, of course, called for if infestations of cestodes, nematodes, or other parasitic organisms are discovered. Of course, hosing of plants, soil, water features, and any solid surfaces should be conducted daily. And where there that is not possible, soil should be regularly raked.

As with softbills in general, aracaris often present little indication of serious illness until shortly before death. While, being playful and curious birds, they may often be on the floor of their aviary exploring, any prolonged time on the floor, or a low perch, should be investigated. If the bird does not promptly fly up and behave normally, this either implies a medical condition requiring immediate attention or some source of stress. Where birds are kept together, the presence of one on the floor or a perch close to the ground may well indicate conflict, or discomfort between cagemates. Often, when an aggressive bird is removed from an enclosure, a bird which had been behaving in the manner described will immediately return to normal behavior.

While hand-raised aracaris can certainly make delightful pets, birds which were kept as pets, then placed in an aviary situation, can be absolute terrors. Former pets, paired up with potential mates can be extremely unpleasant to work with. While they may get along fairly well with another aracari, they often appear determined to destroy humans. Some specialize in flying into faces. People have been sent to hospitals. I won't forget staring at my contact lens torn almost in two, lying in the dirt at my feet, the work of a Collared Aracari which had been engagingly tame until it was paired up. Such birds require the rapt attention of anyone working in their enclosures. In some cases, they can be made to direct their disfavorable attention towards inanimate objects, or ones' feet (if one has on solid footwear).

This is not to say that hand-raised birds don't make good breeders. If multiple hand-reared chicks are housed together through weaning, and after, they may sometimes end up acting like wild-caught birds, indifferent to humans, or actually frightened of them. More often, they may still be inclined to approach people closely, especially while food is provided, or sometimes perch on hands or arms, but are never aggressive.

At the Dallas World Aquarium, a female Green Aracari, estimated to have hatched 9 July 2005, was pulled for hand-rearing with its two male siblings on 9 August, at which point it was well feathered with eyes fully opened. All three chicks were weaned 24 August.

By 4 September, they appeared to have lost any association between hands and food. They were transferred to an outdoor holding area 6 September. On 6 March, 2006, the female, and a wild caught male (imported from Venezuela 22 January 2002) were placed in a large planted aviary, where the female was observed taking food from the male 11 April. On 22 April 2006, this pair was transferred to the previously mentioned 4'X4'X20' cage, 8' above the floor. Eggs appeared to have been laid 9 May, and, perfectly one cue for a sixteen day incubation period, chicks appeared to have hatched 25 May., 2006.

It also should not be assumed that attacks on humans occur only from captive-bred birds. Jerry Jennings obtained Collared Aracaris collected in Honduras in 1988. One pair went to nest in 1989. Jennings (1990) writes: "As the nesting cycle progressed, the parents became increasingly aggressive. By the time the chicks were a few days old, the female would fearlessly attack anyone entering the flight, thus making nest inspection hazardous." I have not personally experienced aggression from any of the nesting pairs I've worked with, but, of course, concerning live animals, one should be prepared for anything.

An imprinted pet aracari, if frequently handled and allowed exercise outside its cage, can be satisfactorily housed in a 2'X2'X4' cage. In cage situations, the copious amount of feces an individual aracari produces becomes apparent very soon, and the substrate should be changed daily. Fairly frequent cleaning of the cage itself will be found necessary.

Breeding pairs of aracaris can be severely antagonistic to any other aracari. Pairs housed in adjoining aviaries should have some sort of barrier between them. Black shade cloth works well in most situations. In general, it is good practice not to house pairs of the same species side by side, but interspersed with others, where possible.

Where birds are settled in their aviaries, and stress is at a minimum, alarm calls should not be frequent. These sudden brief calls are quite recognizable, and vary among the species. Those of Collared, Black-necked, Chestnut-eared and Many-banded Aracaris are high, sharp, and piercing. Those of the Curl-crested Aracari is very distinctive – a deep, explosive croak, which reminds me somewhat of a raven.

While breeding pairs are optimally housed alone, maintaining ground birds in the same aviary works fairly well, especially if it is intended to pull aracari chicks before they leave the nest themselves. As the fledged aracaris will be disoriented and somewhat uncoordinated upon emerging from their nest into the world at large, it's just as well not to have birds in the aviary that might pose a danger, if only from inquisitiveness. At any rate, a breeding pair of Green Aracaris at The Dallas World Aquarium have proved excellent parents while sharing an aviary with Ocellated Turkeys, and the breeding pair of Pale-mandibled Aracaris at the Los Angeles Zoo shared their exhibit with Impeyan Monals.

Breeding pairs of Aracaris have also been successfully maintained in large mixed species exhibits. A pair of Green Aracaris exhibited in the 519,060 cubic foot Rain Forest at the National Aquarium in Baltimore hatched and reared three chicks in 1990, and five in 1991. At the time, this exhibit housed forty birds of sixteen species. In 1990 seven Scarlet Ibises, three Hawk-headed Parrots, and four Silver-billed Tanagers were parent-reared there as well (Krussman, 1991). In addition, four separate clutches laid by one pair of Red-capped Cardinals (*Paroaria gularis*) were reared to fledging, when the nest and one or both parents were enclosed in a cage till the chicks were independent, producing a total of seven chicks. These multiple success with cardinals and tanagers occurred despite interference on part of the aracaris. Regarding the cardinals, Rosemary Krussman (1991), Aviculturist at the National Aquarium noted: "On a number of occasions, the Green Aracaris have been seen actively destroying nests and have been suspected of robbing them of their eggs. Therefore, much of the bird's time constructing and moving the nest as necessary". Ms. Krussman also noted more Silver-billed Tanagers would likely have been reared, but for the fact that keepers actively rendered some of the eggs infertile, as there was difficulty in surplussing this species!

At The Dallas World Aquarium, a pair of Collared Aracaris hatched one clutch after another, from 2001 through 2004 in the 25,000 square foot Orinoco exhibit. Chicks were removed for hand-rearing, partially from concern over open displays housing Orinoco Crocodiles and Giant Otters. Around twenty species of birds were maintained in this exhibit during this time, including Green and Crested Oropendolas, both rearing chicks. The bag-like nests of these giant oriole relatives prove capable of resisting intrusion from other birds. Keel-billed and Swainson's Toucans also shared this exhibit.

A single specimen, or a single sex group of aracaris can be an attractive feature of a mixed species aviary, keeping in mind, that, as was the case in Baltimore, they are likely investigate nests. As a intended display primarily for exhibition purposes, an aviary including aracaris with such birds as *Paroaria* Cardinals, *Ramphocelus* and *Thraupis* Tanagers, Saffron Finches, Troupials, or species of similar size and personality, can be extremely attractive, and work quite well.

Diet

Now that low iron commercially-manufactured softbill foods are easily available, feeding ramphastids is uncomplicated.

The Dallas World Aquarium diet for all of its 25 species and subspecies of toucans, toucanets, and aracaris is presented as two components. A mixture of one part *Mazuri Zulfite Soft-bill Diet* to three parts *Kaytee Exact Original Low Iron Maintenance Formula* is provided, dry, at all times. A mixture of diced papaya, cantaloupe, and honeydew melon is fed each morning, and replenished in the afternoon. Each aracari will easily eat a measuring cup of fruit mixture daily. Papayas are preferred, and when prices permit, is entirely satisfactory as a sole fruit, when ripe. Aracaris definitely favor sweet fruits. Hard, dry, tasteless papaya will be eaten when nothing else is available, but should be avoided. As treats, sliced grapes and blueberries are avidly consumed. Diced apple is

not a food of choice. In mixed collections of softbills, it is noted that apple is generally the last thing left when bowls are pulled for cleaning. (In this era of Iron Storage Disease consciousness, it has become common knowledge that fruits with a high citric acid content can be a definite menace if regularly included in ramphastid diets. Dangerous fruits include all citrus, pineapple, and tomatoes). At The Dallas World Aquarium, the chopped fruit is supplemented with canthaxanthin, primarily for the Cocks of the Rock, but definitely beneficial in maintaining beak, skin, and plumage colors, which otherwise often show a tendency to fade in captivity (Bragin, 2003)

Aracaris readily eat crickets, which can be dusted with a calcium supplement, of the kind sold for reptile keeping. Thawed frozen crickets are eagerly accepted. Crickets can also be immobilized to various degrees though refrigeration.

At The Dallas World Aquarium crickets are especially fed to encourage reproduction, and always provided to pairs on eggs or raising young. Near the time eggs are expected to hatch, the mixed dry pellets are replaced with the *Kaytee Maintenance Formula* pellets only, soaked in a mixture of distilled water and condensed pureed papaya (which can be purchased at health food stores),. The moistened pellets are removed and replaced daily. The standard fruit mixture continues to be fed, with an emphasis on papaya when possible. Soaked pellets and the fruit mixture are the hand-feeding diet as well.

Propagation.

From the time their head feathers appear, the sexes of Green and Lettered Aracaris can be determined by head color. Males have black heads, while the female's heads are brown. More subjectively, Ivory-billed Aracaris may also be sexed by head color, and Chestnut-ears have different proportions of brown on the crown. In general, males have larger, longer beaks, but otherwise, surgical sexing is the usual method of determining sex among most aracaris.

Ideally, pairs to be set up for breeding should be parent-reared, or hand-fed in the company of other aracaris, through and after weaning. As previously noted, highly imprinted aracaris, especially birds previously kept as pets, often fail as satisfactory breeders. Even when they prove compatible with a mate, they may often ignore them in favor of either attacking or courting humans, and may also engage in abnormal behaviors such as destroying eggs or chicks.

It is optimal to place a potential pair in an aviary at the same time. Such introductions must be closely monitored. It is to be expected that alarm calls will initially be frequent, and that there will be mutual avoidance. Some beak fencing, chasing, and even brief feather pulling may occur, without escalating into a situation where the introduction must be terminated. Obviously, if introduced birds engage in more than momentary physical contact, gripping each other with beaks and claws, intervention is called for. If one bird is noted to be staying on the ground, hiding away in low foliage, or cramming itself into holes or corners, or under objects, especially after more than an hour or two after

introduction, separation may be necessary. Both birds should be noted to be eating and drinking from the standard stations within no more than several hours after introduction.

If separation is necessary, the more aggressive bird should be removed, and either “howdied” in a cage within the aviary, or placed near enough for at least vocal, if not visual contact to continue. Usually, about 24 hours should elapse before an attempt to reintroduce the aggressor is made. If a bird is to be introduced to another already resident in the aviary where breeding is intended, it should be “howdied” for at least 24 hours, and again, close surveillance should be conducted. Even in established pairs with a breeding history, aggression between mates may erupt, becoming evident in aggressive contact or abnormal behavior. Again, the aggressor should be separated out, but maintained in visual and sound contact. Where aggressive behavior is persistent, favorable results have sometime been attained by impeding the aggressor’s mobility through feather clipping (Bragin, 2003). On the other hand, where aggression is chronic, repairing may be the only productive strategy.

Green Aracaris have hatched chicks in captivity every month of the year. Examining the data from 1988 through 1997 (the first ten years Green Aracaris were bred in U.S. public zoos) presented in the North American regional studbook (Bragin, 2003), I found 63 separate clutches of chicks were produced among twelve collections, totaling 110 individual specimens. Ten clutches hatched in August, nine each in May and June, eight in September, seven each in April and July, four in February, three in March, two each in January, November, and December, and one in October.

Other aracaris appear to be more seasonal in reproduction, with indicative behaviors appearing in the spring (periods of low barometric pressure, before rains, often precipitate reproduction). For instance, in two different pairs of Ivory-billed Aracaris at the Dallas World Aquarium in 2005, the male was first seen stroking the female with its beak on 29 March, and 6 April, respectively. Prolonged perching in very close proximity, or actually bodily contact was first observed 3 April and 6 April, and nest log investigation commenced 13 April and 29 April.

Copulation was never observed in the pair whose activities commenced 6 April, but was observed in the other on 8 May and 11 May. That pair began alternating extended periods in the log 14 May, and the female began accepting food from the male 16 May. (The male had been attempting to feed the female since 19 April). A 3 June nest log check revealed one egg and one chick. Two chicks were seen 7 June, by which time both birds were spending most of their time outside the log. The chicks were pulled for hand-rearing 18 June. The log was replaced 22 June, and on 28 June, the male was again observed stroking the female with its beak, as well as gently nibbling it. The same day, the female began spending extended periods in the log. Copulation, accompanied by much nibbling of the female’s head and neck, was observed 6 July. However, no further eggs appear to have been laid in 2005, likely because of the onset of very hot weather.

In 2006, this pair, which had began showing reproductive behavior 29 March, 2005, began maintaining bodily contact, with the male nibbling the female’s head and neck, on

17 March. The female began immediately accepting food from the female 5 April (more than a month before it did so in 2005). Attempted copulation was first seen 7 April (again, a month earlier than in 2005). The first log investigation by the female was witnessed 11 April (about the same time as the previous year). The spending of prolonged periods in the log commenced the next day, though, through 15 April, both were observed out, with the male nibbling the female. By 18 April, things had settled to the point where there was always one bird in the nest. 1 May, both were observed out of the log for prolonged periods. A 3 May nest check revealed two chicks and one egg. Chick vocalizations became quite audible by 20 May, when the log was again investigated, yielding three chicks, which were taken for hand-rearing. When this pair were engaged in precopulatory activities (beak-stroking and nibbling) there was much vocalization – a high sound that could either be described as whining or mewling.

Green Aracaris are definitely less vocal. Some times, while the male offers food to the female, a low grunting sort of vocalization may be heard. In contrast to the larger aracaris, Greens do not spend much time in bodily contact, or beak-stroking or nibbling. Reviewing my notes on two breeding pairs of Greens at The Dallas World Aquarium, I'm startled to find only a single reference a male touching the female with its beak. A pair which hatched chicks around 7 July, 2005, commenced that year's reproductive activities 20 April, when the female was seen to rather forcibly take a cricket from the male. By mid-May, the female was spending prolonged periods inside the log. Eggs were discovered 7 June, and apparent chick feeding noted by 13 June, but the nest proved empty upon inspection 21 June. Meantime, copulation, without the elaborate precopulatory behavior noted for Ivory-bills, was observed on 14 and 18 June. As the incubation period for all ramphastid eggs is 16 days, the clutch presumed to have commenced hatching 7 July, was begun around 22 June. During this entire period from April, I once noted the male nibbling the female, then briefly taking its head in its beak, on 28 June.

For American aviculturists, procuring palm logs is not a tremendously difficult procedure, the main expense likely to be shipping costs. These make ideal nests. Aracaris are quite capable of excavating nests out of logs on their own. Such was the case at Los Angeles Zoo in 1974, where Curl-crested Aracaris produced three clutches of infertile eggs, and Pale-mandibles hatched the first aracari chicks hatched in captivity (Rundel, 1976). The afore-mentioned breeding pair of Greens at the National Aquarium in Baltimore likewise excavated their own nest (Krussman, 1991).

On the other hand, aracaris will readily nest in logs that have already been hollowed out. This allows, in the case of multiple pairs, for fairly standardized maintenance, especially regarding nest inspection, when a removable wooden roof to the log can be very useful. Care must be taken not to cut the entry hole too large, as too much light, and like of seclusion will definitely discourage nesting. It should be no more than three inches in diameter. Two-and-a-half inches will be quite adequate for Green Aracaris (Jennings, 1983). The hole should be located several inches below the top of the log. Logs should preferably be at least two feet tall, but any artificial excavation should allow for eight to ten inches of further excavation by the birds themselves (Jennings, 1983). They should be

situated at least four feet above the floor of the aviary, preferably higher, but of course allowing for safe access by the aviculturist.

Stuffing pre-excavated logs with shavings creates almost immediate interest in most ramphastids, and often stimulates reproductive activities. A pair will continue excavation of its log throughout their reproductive career, and may eventually dig through the bottom (Rundel, 1976). Thus, inspection of the base of the log should be conducted at intervals.

Aracaris have done quite well with entirely artificial nests. The first United Kingdom breeding of the Green Aracari was achieved by Chris Iles (2004). His nest box, illustrated in his *Avicultural Magazine* account, was “made quickly from two right angles from an old set of stairs, with a piece of melamine [plywood] nailed on the bottom. The inspection lid was a further piece of melamine held on by a rubber band. It was nearly two feet (61cm) down to the bottom of the angled box”. This box was fastened at a slant to the side of the aviary. Chicks from two clutches were parent-reared in 2004.

It is a reflection of the fairly recent and explosive evolutionary radiation of the ramphastids (which many now consider a only a subfamily of the New World Barbets (Sibley & Ahlquist, 1990, Sibley & Monroe, 1990), that for every one of the 40 or so species of toucans, toucanets and aracaris, the incubation period for eggs is sixteen days (Jennings, 2005a). Clutch size varies from two to four.

During incubation, one parent or the other is generally in the nest. Once chicks have hatched, both parents will be out in their aviary for increasing periods of time. At that point, parental feeding behavior and overall food consumption indicate how things are progressing. It is essential that while chicks are in the nest, food is available at all times. As mentioned earlier, prior to the projected hatch date, pelleted foods should be presented moistened, as food provided by the parents will be the sole water source until the chicks leave the nest. Favored foods, such as crickets, are indicators that all is well, when they are promptly taken into the nest. For the first three weeks, chick mortality due to parental stress is a danger, when chicks may be cannibalized, or thrown out of the nest. Mary Jo McConnell (1991) documented a case where both a male and female Green Aracari ate chicks the day after hatching, and the two remaining from a clutch of four had to be removed for hand-rearing and eventual fostering to Spot-billed Toucanets. Further cannibalism was prevented when this pair of Greens were provided with mealworms and crickets (previously absent from their diet), and parent-raised two chicks.

With such things in mind, it can be alarming to see a parent aracari emerging from a log carrying something solid and flesh-colored. If all is well, this will prove to be a fecal mass, which the parent will proceed to break up and distribute around the aviary. Ramphastid nests are remarkably clean, as all feces are thus disposed of. (No nesting material is used. The chicks sit in rather upright position on the bare wood, supported by their remarkable spiky halluces).

Should something happen to one parent after the chicks are hatched, the other may be quite capable of rearing them alone. At the Barquisimeto Zoo, in Venezuela, the male

was removed on the suspicion that it was killing chicks (Pernalete, 1989). Of the two remaining chicks, one died two weeks later, the other fledged seven weeks after after the removal of the male.

Until the 1990's, hand-raising ramphastid chicks less than ten days of age was problematic, with a high failure rate. Much progress has since been made. Major causes of mortality in the first week had been dehydration and candidiasis. Jerry Jennings, who preferred to avoid handfeeding before the tenth day, when I worked with his birds (1989-1991), has since developed a successful protocol for newly-hatched chicks through the first weeks (Jennings, 2005a). This includes prophylactic use of the antifungal agent Nystatin, three times daily for the week following hatching. Nystatin is also administered for a week following episodes of dehydration, which are treated with a rehydrating regimen of Pedialyte and water. At Emerald Forest Bird Gardens, newly hatched chicks are maintained in brooders at 95-97F at 90% humidity, and fed every two hours, from 6AM till 10PM. Feedings consist of *Kaytee Exact* handfeeding formula, supplemented with Gerber's Guava baby food, mixed thick and fed at room temperature. These are administered by syringe. In the first four days, each feeding consists of 5% of the gram body weight in cc's, increased to 10% thereafter, and then to 15% at three weeks. (A 100 gram bird would receive 15cc's of formula). Feedings are reduced to every two-and-a-half hours after three weeks.

At The Dallas World Aquarium, chicks pulled at around two weeks are fed six times a day, from 7AM to around 5:30PM or 6PM. They are maintained at a brooder temperature of 85-90F. Feeding at this age is very simple, as the chicks are quite eager to take food from forceps. The diet consists entirely of diced papaya, with some cantaloupe and honeydew melon, and *Kaytee Maintenance Formula* pellets, moistened to marshmallow consistency with papaya puree and distilled water. I usually offer roughly equal amounts at each feeding.

As an illustration, the afore-mentioned 2005 hatching of Ivory-billed Aracaris serves well:

A nest inspection on 3 June revealed one egg and one chick. Two chicks were discovered 7 June. On 18 June, at 4:45PM, they were removed from the log. Feather tracks were clearly visible beneath the skin. Their weight at pulling was 75g and 84g. The chicks received a single treatment for a light mite infestation. Each was fed 11g of the aforementioned diet, then lights were turned out till shortly before 7AM the next morning, 19 June. Prior to their first feeding, the chicks were found to weigh 68.9g and 75.9g. The larger chick received 86.9g of food administered over six feedings, from 7:33AM to 5:50PM, while the smaller received 77.5g. On 20 June, the older chick showed a pre-feeding weight increase of 4.6g, while the younger bird's weight increased by 5.5g.

Both eyes of both chicks opened 22 June, when the younger chick could not have been any older than 19 days. (Some sources give the age when eyes open as "23-25 days"). On 24 June, the red color of the neck feathers could be clearly seen beneath the skin of

both birds. On 27 June, both weighed exactly 105g, having received 75-85g of food daily. On the morning of 4 July, the older bird weighed 126.6g, having consumed 77g the day before, while the younger weighed 126.5g, having eaten 100g on 3 July. From this point, weights for both chicks hovered between 125 and 135 g, with the younger outpacing the older.

On 15 July, having both feathered out, they were transferred from their brooder to a cage in the nursery, with continuous access to food in a bowl, though they continued to receive six hand-feedings a day. The older chick weighed 132g, while the younger weighed 135g. The next morning, their weights were 118g and 121g, respectively. By 19 July, they were definitely eating some food on their own (The older chick weighed 123g, the younger, 131g). Hand-feedings were reduced to three times daily on 24 July, when the older chick's morning weight was 136.5g, and the younger weighed 142g. The next day, their morning weights were exactly the same. On the morning of 26 July, the older bird weighed 137g, and the younger weighed 145g. These were the final weights taken, as the birds were considered weaned as of 27 July. (Analyzing field notes and collector's data from museum specimens of *Pteroglossus azara flavirostris*, the subspecies which The Dallas World Aquarium's Ivory-bills most resembles, Short and Horne (2001) found the weight of 17 adult males to range from 117-200g, averaging 151.8g, and that of eight adult females to range from 120-165, and average 140.3g. Both of the 2005 chicks were eventually determined to be males.)

The parents of the above-noted birds produced three chicks, hatched over a several day period, around the beginning of May, 2006 (Two chicks and one egg had been discovered during a 3 May inspection). Chick vocalizations were very audible from outside the aviary by 20 May, 2006. The chicks were removed for hand-rearing that day. It was then noted feather tracks were discernable on their wings. The largest chick was noted to have one eye open 24 May, 2006, and the other on 25 May. The red neck feathers were discernable beneath the skin 24 May. On 26 May the tips of the largest chick's primary feathers emerged. Its head feathers began "popping" 27 May, by which time the youngest chick's eyes had started to open, and the middle bird's eyes were fully open.

As noted earlier, three Green Aracaris, estimated to have hatched at The Dallas World Aquarium 9 July, 2005, were pulled for hand-rearing 9 August, when they were well feathered, with eyes fully opened. All were weaned 24 August.

As previously noted, Green Aracaris may breed throughout the year. Pairs are capable of producing a startling number of broods in short period. The San Antonio Zoo obtained four wild-caught Green Aracaris 20 November, 1986. A male, studbook #37, was paired with female #39 (Bragin, 2003). A hatch date of 25 March, 1988, is given for the first three chicks this pair produced. One died 31 March, 1988, the others went to other zoos. Two chicks recorded as hatching 11 July, 1988, died 19 July. Two more hatched 26 August, 1988, dying on 5 September, and 8 September. The next three chicks hatched 30 & 31 March, 1989. One died 6 April, 1989, the others were transferred elsewhere. Both chicks hatched 3 June, 1989, eventually went to the Riverbanks Zoo. Their parents hatched two more 8 August, 1989, both also going to other collections. A chick hatched

8 October, 1989, died at San Antonio in 6 November, 1991, the day after the single chick hatched 27 May, 1990 also died there. Of the chicks hatched 24 & 25 August, 1990, one died 2 September, the other was transferred to St. Louis. The single bird hatched 10 December, 1990, died four days later. Two males were hatched 30 January, 1991, and a female the next day. All went to other collections.

After this, things slowed down. #37 and #39 produced one chick on 27 February, 1992, which died 10 March, 1992. No further hatchings are recorded for this pair until when they hatched a single chick 23 May, 1995, which died 7 June, 1995. This proved to be their final offspring. # 37 died at San Antonio, 30 June, 1996. # 39 died there 9 June, 1997.

I have come across very little mention of Aracaris reneating in the presence of previous offspring. I've found no evidence of assistance in the care of younger siblings. Chris Iles (2004), regarding his Green Aracaris, writes: "In their first clutch there were four eggs, two of which hatched and both chicks were reared. They then produced a second clutch and reared a further three young to independence. The cycle from the first egg to commencement of the second clutch seemed to be eight to nine weeks. The first two young were left in the aviary during the second nesting. The parents would 'purr' over their young with obvious delight... At the time of writing (September), the Autumn sunshine has enticed the family to show-off their lovely colours and say their impressive bills. They seem to have enjoyed the summer, and I cannot help but wonder whether they know of their contribution to aviculture in being the first pair of *Pteroglossus viridis* to breed in the UK."

Species Accounts

Green Aracari (*Pteroglossus viridis*)

To the uninitiated, most aracaris "look alike", and can cause considerable confusion. The Green Aracari, on the other hand, is usually recognized right away. While similar in plumage and facial skin colors to the currently unavailable Lettered Aracari, its highly distinctive beak, with its broad, mustard-colored culmen, immediately sets it apart, and its unpatterned greenish yellow underparts distinguish it from all the rest of the Aracaris. At an average weight of 135g, and length of ten inches, it is the smallest toucan currently in U.S. aviculture. It is also the most obviously sexually dimorphic. In all lights, it can be plainly seen that males have black heads and females have brown heads. (This is true as soon as head feathers start appearing at about 25-30 days after hatching.)

Its range is essentially limited to that portion of South American traditionally called The Guianas: It occurs throughout lowland forests in Guyana, Surinam, and French Guiana, as well as bordering portions of Venezuela and Brazil. This distribution is essentially the same as the Sun Conure, with whom it shares a remarkably similar avicultural history. Prior to the late 1970's, both were rarities in captivity, which few people had seen. Then, in a few years, they became frequently displayed in zoos, and widely available to private aviculturists. Listed on CITES appendix II, both were prohibited from commercial

import to the U.S. with the implementation of the Wild Bird Conservation Act in 1993. And both have continued to be widespread and comparatively easily obtainable entirely through captive propagation.

The first captive breeding took place in 1980, at Walnut Acres Aviaries, as Jerry Jennings' collection, then located in Woodland Hills, California, was known at the time (Jennings, 1983). (This launched Jerry's career with toucans. Prior to this, and for some years after, his reputation was as a finch specialist.) The first zoo breeding took place at Disney's (since phased out) Discovery Island in 1988 (Bragin, 2003). The same year, the San Antonio Zoological Gardens and Aquarium was also successful. The remarkable career of one of San Antonio's two breeding pairs has already been discussed in these pages, as have the interesting circumstances at the third public institution to breed this species, the National Aquarium in Baltimore. Through 1992, Discovery Island, San Antonio, the National Aquarium, and the St. Louis Zoo (where the first second generation hatching occurred in 1992) were the only public collections to hatch Greens. However, in 1993 (the year commercial imports ceased) six U.S. zoos and related institutions hatched Green Aracaris, including four that had not previously bred them.

As of 11 November, 2003, 206 Green Aracaris had hatched among a total of eighteen U.S. zoos and related collections (Bragin, 2003). At that point, the most successful collection was San Antonio, where, after a hiatus since 1995, propagation resumed in 2001, so that 40 had hatched there since 1988. The Dallas World Aquarium, which augmented the pre-existing Guyanese and Surinamese stock with three specially imported birds from Venezuela in 2001, only began breeding Greens in 2001, with specimens from Jerry Jennings' Emerald Forest Bird Gardens. Commencing in 2002, The World Aquarium was especially successful with a pair composed of an Emerald Forest hen paired to a male hatched at Denver Zoo, and in 2003, a pair from Venezuela began producing chicks as well. Through 11 November, 2003, the period covered by the Regional Studbook (Bragin, 2003), The Dallas World Aquarium hatched 29 chicks. Four were hatched in 2004, and six fully reared in 2005. In 2006, as of June, three separate pairs have produced chicks, two still in the nest, parent-reared, as I write.

Through 1996, the only *International Zoo Yearbook* (Zoological Society of London, 1959-1998) listings of Green Aracaris outside the U.S. have been for the enormous Walsrode Bird Park, in Germany, where breedings took place in 1993, 1995, and 1996. As of mid-May, 2006, the International Species Information System (ISIS) lists 23 specimens distributed among nine zoos in Continental Europe and the U.K., with breeding in the last six months indicated for the Attica Zoological Park, in Greece. As earlier discussed, the first U.K. breeding took place in 2004 (Iles, 2004).

According to ISIS, 84 Green Aracaris were maintained among 23 U.S. zoos and related collections as of mid-May, 2006. Since 1997, this population has been managed as a PMP (Population Management Plan), under the auspices of the Association of Zoos and Aquariums (AZA). As of 2003, Studbook Keeper Nanette Bragin was able to report there was no inbreeding in this population.

U.S. private aviculturists have also done quite well with Green Aracaris, and hand-raised pet birds and breeding stock can usually be located without a great deal of effort.

Lettered Aracari (*Pteroglossus inscriptus*)

The *Encyclopedia of Aviculture* (Rutgers et al, 1977) forthrightly states: "The lettered Aracari is probably the best known, the most frequently imported and about the smallest of all toucans". The first two statements might have been true in Europe before 1967, but that year, the Government of Brazil banned commercial shipments of birds, and in several years, this species vanished from aviculture outside of South America (though the London Zoo obtained two specimens as late as 1970 (Zoological Society of London, 1970)). The last specimen in the U.S. of which I am aware was one at the San Diego Zoo that lived into the early 1970's. To my knowledge, this species has never been bred in captivity outside of South America, though this appears to have occurred in Peru (Jennings, 2004c).

Lettered Aracaris are not confined to Brazil, but are found across a vast area of lowland forest, essentially following the Amazon. Since the 1970's, Peru has allowed few bird species out of its Amazonian territories, and other countries, such as Colombia, Ecuador, and Bolivia, have either not allowed recent exports, or largely exported birds from upland forests.

This is the only species which could possibly be confused with the Green Aracari, being of similar size, with black-headed males and largely brown-headed females, and sharing clear yellow underparts and red and blue facial skin. The beak pattern is the immediate distinguishing point. True to the common name, the edge of the upper mandible is ornamented with black squiggles. There are two subspecies, essentially separated by the Madiera River. *P. i. inscriptus*, found east of the Madiera, the bird once exported in numbers from Brazil, is smaller than the Green Aracari, with an average weight of less than 120g, The Northwestern *P. inscriptus humboldti* is a significantly larger bird, with an average weight of over 145g (Short & Horne, 2001).

There have been at least two recent attempts to import Humboldt's Lettered Aracaris from Peru to the U.S.. So far this has not come to pass, but some parties remain optimistic.

Red-necked Aracari (*Pteroglossus bitorquatus*)

Until Brazil banned commercial bird exports in 1967, this bird, then generally referred to as the "Double-collared Aracari" was well known to aviculturists in Europe, and to a somewhat lesser extent, the U.S. Henry Bates and Robert Busenbark, who imported softbills through their Palos Verdes Bird Farm, near Los Angeles, do not appear to have considered it particularly rare (Bates & Busenbark, 1963). They certainly considered Green and Black-necked Aracaris much harder to find.

While the former common names “Double-collared” or “Double-banded” might imply a confusing similarity to other species, this is definitely one of the more distinct Aracaris. It has no black markings beneath. Instead, Bright red meets bright yellow (in varying combinations, depending on the subspecies). The unpatterned banana-yellow upper mandible, contrasting, in two of the three subspecies, with a black-and-white lower mandible is also striking. Bates and Busenbark (1963) declared this species to be “perhaps the most attractive of all aracaris because of its uniformity and sharpness of coloring”. An excellent photo of birds imported by the Louis Ruhe firm to its avian facility in New York City is published in *National Geographic* (Zahl, 1953).

As the entire range of this species is almost restricted to Brazil (with otherwise a small portion of Bolivia), there appeared little likelihood of seeing it in U.S. aviculture after the 1967 ban. However, in 1987, the San Diego Zoo imported a pair, of the nominant subspecies, that had been resident in Europe. They were displayed, with some fanfare, in their own aviary. Here this pair nested in 1992, hatching a single chick, which did not survive. Subsequently, this pair did raise a male offspring, but the female died shortly thereafter. The two males were the object of much admiration during the lifespan at San Diego. According to ISIS, the only specimen outside of South America in 2006 resides at the Jurong Bird Park in Singapore.

Ivory-billed Aracari (*Pteroglossus azara*)

Not to be confused with any other aracari, this species is distinguished by a bright red chest, broadly bordered with black, which, in combination with its green wings, reminds me of a Forsten’s Lorikeet. Adding to its distinctive appearance are dark eyes, surrounded by dark red skin, and a beak reminiscent of an old Meerscham pipe.

The Ivory-billed Aracari occupies a major portion of Northern South America, occurring in Colombia, Venezuela, Ecuador, Peru, Bolivia, and Amazonian Brazil. It is not a rare bird in the wild. The husband and wife team of ornithologists, Lester Short and Jennifer Horne (2001) state it is the “commonest toucan on [the] Upper Orinoco”. However, until this decade, it was always an extreme rarity in captivity. I am aware of no records in the U.S. prior to the arrival of one bird at The Dallas World Aquarium, in 2000 which came from Jurong Bird Park, in Singapore. Specimens did arrive in England in the 1960’s. Rutgers et al (1977) mention one seen there in 1960, and in 1967, the London Zoo received one (not its first), as part of a collection from the Hon. Lady Bailie (who started the aviaries at Leeds Castle) (Zoological Society of London, 1967). Somewhat confusingly, these English specimens were referred to as “Yellow-billed Aracaris”. The beak is nowhere as yellow as the upper mandible of a Red-neck. “Ivory-bill” is far more apt.

In 2002, in coordination with the Venezuelan government agency, PROFAUNA, and FUNZPA (Venezuela’s National Foundation of Zoological Parks and Aquariums) The Dallas World Aquarium imported several pairs of Ivory-billed Aracaris. With a pale coffee-colored wash along the edge of the lower mandible, they essentially match the description of the North-western subspecies *Pteroglossus azara flavirostris*, but differ in

lacking the small orange mark below the nostril, that is supposed to be diagnostic of this subspecies (Short & Horne, 2001).

In 2004, through arrangement with the Peruvian Government, Jerry Jennings imported a number of specimens from Amazonian Peru to his Emerald Forest Bird Gardens. A pair of these was received by the Dallas World Aquarium in 2005. With a largely dark brown lower mandible, they are typical specimens of *Pteroglossus azara mariae* (referred to in old books as the Duchess of Leuchtenberg's Aracari), of Peru, Bolivia and Amazonian Brazil. Sibley and Monroe (1990) lists this bird as a full species, *Pteroglossus mariae*, on the basis of its being found together with *P. a. azara* in Brazil. However, Short and Horne (2001) point out that hybridization in the wild has occurred between *P. azara mariae* and both *P. a. azara* and *P. a. flavirostris*, so designating separate species is not called for.

Short and Horne (2001) state that these three subspecies differ only in beak pattern. I was therefore intrigued to see that both of the Peruvian *P. azara mariae* at The Dallas World Aquarium had entirely red feathers on the back between the wings, whereas all the Venezuelan birds at the Aquarium have a mixture of green and red. This bears further investigation, though Short and Horne (2001), who are aware of variation of coloration of the upper and mid-back, do not appear to consider this of taxonomic significance, but rather something more along the lines of black and red plumages in Stella's Lorikeets.

If they are seen in very good light, or examined in the hand, the sexes of Ivory-bills may be determined visually. The heads of males are black, while the heads of females are a very dark shade of brown.

As discussed in detail earlier, the first Ivory-billed Aracaris hatched outside of South America were bred at the Dallas World Aquarium in 2005, from Venezuelan parents. These birds, both males, have been paired up with wild-caught mates. Their parents have so far produced three chicks in 2006. The Dallas World Aquarium currently maintains twelve Venezuelan birds and a pair of Peruvians, all off-exhibit. As of May, 2006, Jerry Jennings told me two pairs of his Peruvians were on eggs.

Black-necked Aracari (*Pteroglossus aracari*)

The *Encyclopedia of Aviculture* (Rutgers et al, 1977) has this to say on the subject of Black-necked Aracaris: "Although it is common in its native country, it is not imported in very great numbers, and several other species of aracaris, such as *P. viridis inscriptus* [the Letterd Aracari] are usually more readily obtainable". Bates and Busenbark (1963) referred to the "very rare Mount Roraima Aracari from southeastern Venezuela, British Guiana, and Surinam". In 1982, Eduard J. Hamilton, who was privately importing birds from Guyana, told me, with great excitement, that a shipment would include "Mount Roraima Aracaris". Ten years later, Black-necked Aracaris were, as Jean Delacour would have said, "as common as dirt!" From the late '80's to the early 90's, they arrived regularly at Florida quarantine stations from Guyana, in much greater numbers than Green Aracaris. As of June, 1992, ISIS listed eleven U.S. Public collections exhibiting

Black-necks. Then, in 1993, implementation of the Wild Bird Conservation act prohibited commercial import of this CITES Appendix II-listed species. As of May, 2006, the only specimens in U.S. zoos are two males at The Dallas World Aquarium, and one at the Jacksonville Zoo in Florida. According to Jerry Jennings (2005) it is still “fairly common” in U.S. private collections, but I don’t know of anyone in particular who’s doing really well with it.

I suppose one reason this bird’s U.S. zoo population collapsed (while the Green Aracari, also banned in 1993, is thoroughly established), is that it’s one of those aracarids that’s easily confused with other aracarids. The immediate distinctive features are its eyes and facial skin that look black in most lights (though they are actually brown and gray, respectively, under close examination). The Dallas World Aquarium has a bird, obtained from the Riverside Zoo, at Scott’s Bluff Nebraska, with pearly gray eyes. According to Short and Horne (2001), this is within the range of variation, with no correlation to geography. Jerry Jennings tells me this may also be an artifact in captive-bred specimens, due to diet, or being kept indoors under artificial light.

According to the *International Zoo Yearbook*, one hatched, but died, at the Gladys Porter Zoo, in Brownsville Texas in 1978. Jerry Jennings (2005b) credits the Florida aviculturist Dick Muench with the first complete success, in 1987. Other *IZY* records are for the Barquisimeto Zoo, in Venezuela, where ten hatched, and six reared from 1988 through 1990, the Sedgwick County Zoo, in Wichita, Kansas, where three were hatched and raised in 1991, Dinesy’s Discovery Island, near Orlando where 21 were hatched and reared from 1993 through 1996, and Singapore’s Jurong Bird Park, where two were hatched and reared in 1996 (Zoological Society of London, 1959 to 1998). I have earlier discussed some of the Barquisimeto Zoo’s work with this species (Pernalet, 1989). The Dallas World Aquarium hatched and raised three, from two clutches, in 2003. As can be seen from the records for Discovery Island (closed in 1999), breeding pairs can be prolific.

The population in the Guianas, from which all recent importations were made, remains secure, with much protected habitat. The isolated population on the coast of Brazil, from which occasional specimens reached aviculture before the Second World War, has suffered some local extinctions (Short and Horne, 2001), probably needs monitoring.

Chestnut-eared Aracari (*Pteroglossus castanotis*)

This is another big aracari with banded underparts that might be confused with others. It has an enormous range, sweeping diagonally across South America, from the eastern slopes of the Andes, South from Colombia, through a broad expanse of tropical forest, down to Tropical Argentina, and almost reaching the Atlantic coast of Brazil. Only two, slightly differing, subspecies are recognized over this vast area (Short & Horne, 2001).

During the 1960’s, and into the early ‘70’s, when enormous number of Peruvian birds were exported to Miami, this was not a rare bird in collection, and seen fairly often in

zoos. It's possible that, at times, it may have been the most well-represented aracari in American zoos.

However, it was never hatched in any public zoo until 6 June, 2000, at The Dallas World Aquarium. The breeding pair consisted of a bird imported by The Aquarium under special permit from Brazil, and one bred by Rod Barth, who achieved the first captive breeding 27 May, 1983. The Dallas World Aquarium is presently the only American Zoo holding this species, with six specimens, all off display, at present. Three of these birds have gun metal gray around the eyes. The others have blue skin surrounding their eyes. Again, according to Short and Horne (2001) this is not necessarily indicative of subspecific distinction.

Since 2003, Jerry Jennings has imported a number of Chestnut-eared Aracaris from Peru, and has done quite well reproducing them. As far as I could tell, all of his birds had blue around their eyes. At around 300g, this is the largest of the Aracaris. It may also be the longest-lived. I have been informed that a bird I saw at the San Francisco Zoo in 1990 was one of a pair I remember seeing in 1972. (So far, the best longevity known for a Green Aracari is 14 years (Bragin, 2003).).

With care, and good light, females can be told from males by plumage, at least when they are together, or side by side. Females have more brown in the crown, as opposed to black.

Many-banded Aracari (*Pteroglossus pluricinctus*)

This is another Aracari that can confuse people, having aggressive-looking yellow eyes with bright blue skin around them, like many Chestnut-ears, and a beak almost identical in pattern to a Black-neck. However, true to its name, it also has two complete black bands across its chest, which distinguishes it from any other toucan.

This species has a rather limited range in the north-western corner of South America, found in parts of Venezuela, Colombia, Ecuador, Peru, and Brazil. It has never been common in aviculture, but showed up from time to time. The San Diego Zoo inventoried three "Double-banded Aracaris" on 31 December, 1969, and Jerry Jennings obtained a pair in the 1980's. The Dallas World Aquarium maintains five birds off exhibit. These came from Venezuela through the cooperation of PROFAUNA, and FUNZPA. One of the two pairs I work with daily frequently go in and out of their log, but, so far, nothing consistent has taken place. I regard their activities with a special degree of irritation, as this species has not yet been bred in captivity.

Northern Collared Aracari (*Pteroglossus t. torquatus*)

The Collared Aracari is the only member of its genus found in Mexico, the northern limits of its range located in the states of Veracruz and Puebla. The nominate subspecies extends through Meso-America, except for the Yucatan Peninsula and adjoining territories (where the subspecies *P. torquatus erythrozonus*) occurs. Because the

Yucatan subspecies and the Colombian and Venezuelan *P. torquatus nuchalis* differ only in subtle ways from *P. t. torquatus*, any specimens which may have reached captivity outside of their range are likely not to have been accorded recognition. At any rate, I have not come across any avicultural records.

P. t. torquatus has had a long and varied avicultural career. A pair from Panama were the first Aracarís at the London Zoo, acquired in 1870. Bates and Busenbark (1963) considered it the “most commonly available [member] of this genus”. By the 1980’s, however, it was almost forgotten, having been essentially replaced by (and confused with) its Ecuadorian relative *P. torquatus erythropygus*. Even Jerry Jennings (1990) wrote that it “has only recently been available in the United States, with the first imports dating back to late 1987”. At the time Bates and Busenbark were operating their Palos Verdes Bird Farm, Mexico and Costa Rica were wide open for bird exports, and birds continued to arrive from those countries up to the Newcastle’s Disease import ban of 1972. By the time commercial importation to the U.S. resumed, they had ceased or greatly restricted their bird trade, so Central American Softbills were very rare until the late ‘80’s when Honduras allowed dealer’s exports. Jerry Jennings (1990) obtained eleven birds from this source in 1988. He achieved the first captive breeding of Northern Collared Aracarís in 1989, parent-rearing two chicks, which fledged 9 September.

Honduras did not remain a source of softbills for very long, but in the mid-1990’s Nicaragua, having undergone a transition from a Socialist government to one eager for U.S. funds, began exporting birds, including a fairly consistent number (established by quota) of Collared Aracarís. I have heard that this year’s shipments may be the last. However, a number of private aviculturists, among whom David Foley, with his Jardin Diostede in Florida, stands out, are propagating Collareds with the intention of establishing them as a self-sustaining population in this country. If this happens, it will be an achievement of the private sector, as the Zoo community is committed to maintaining its flourishing population of Green Aracarís. ISIS lists eleven birds distributed among five U.S. public collections as of May, 2006. There are actually more than that, as The Dallas World Aquarium has obtained further birds from Jerry Jennings in 2006. The Aquarium is apparently the only U.S. Zoo to have hatched any, having achieved repeated successes with a pair at large in the great Orinoco exhibit, commencing in 2002.

Pale-mandibled Aracarí (*Pteroglossus torquatus erythropygus*)

Stripe-billed Aracarís (*P. torquatus sanguineus*)

In the days when no one had any Collared Aracarís, no one was particularly upset, since they thought they had plenty of Collared Aracarís. In fact, the common aracarí of the late 1970’s and early ‘80’s in the U.S. was the Pale-mandibled Aracarí, also called the Ecuadorian Collared Aracarí. True enough, this bird is found only in Ecuador and Colombia, but it does not have a “collar”. Neither does its Colombian relative, the Stripe-billed Aracarí, which resembles it closely, differing in being smaller, with a black lower mandible as opposed to the Pale-mandible’s largely whitish mandible. (The Pale-mandibled Aracarí is a big brute, averaging near 300g, almost as big a Chestnut-ear. The

size difference between it and a Central American Collared Aracari (averaging 220g) is obvious, if they are seen size by size. The Pale-mandibled's beak is proportionately bigger, giving it what Jean Delacour might have called a "coarser" appearance.)

The Striipe-billed Aracari has never been common in aviculture, and since Colombia pretty much ended its bird trade in the '70's, it's been nonexistent outside of South America. The San Diego Zoo (which then held five sorts of aracaris) inventoried one on 31 December, 1969.

As previously mentioned, the Pale-mandibled Aracari was seen in England as far back as 1859 (Norris, 1977). In the days before the Panama Canal and the Trans-Continental Railroad, the Ecuadorian Port of Guayaquil was of world-wide importance. In more recent years, Ecuador allowed a flourishing bird trade from the 1960's into the '80's. Three of the first species of ramphastids hatched in the U.S., all at the Los Angeles Zoo in the '70's, were Ecuadorian exports: The Crimson-rumped Toucanet, the Plate-billed Mountain Toucan, and the Pale-mandibled Aracari (Lindholm, 2005). By the late '80's, Ecuadorian shipments became few and far between, although, until this year's Bird Flue scare, shipments occasionally arrived in Europe.

While they were available, Pale-mandibled Aracaris bred fairly well in zoos, and it was not until the 1990's that Green Aracaris exceeded them for numbers hatched in U.S. collections. As previously stated, the first captive breeding of any Aracari took place at the Los Angeles Zoo in 1974 (Rundel, 1976), when six Pale-mandibles hatched there. According to the *International Zoo Yearbook* (Zoological Society of London, 1959-1998), through 1977 Los Angeles hatched fifteen, and reared seven (Lindholm, 2005). I saw three of these offspring at the Bronx Zoo in 1978. The *IZY* details further successes. From 1981 through 1983, the San Diego Zoo hatched out twelve and reared nine, in the huge walk-through Scripps Aviary. (These birds, some of which were acquired by Jerry Jennings, were identified in the *IZY* simply as "Collared Aracaris (*Pteroglossus torquatus*)"). What was then called the Pittsburgh Conservatory Aviary (Now the National Aviary in Pittsburgh) hatched eight and reared four, from 1984 through 1987. The Audubon Park Zoo, in New Orleans, hatched three and raised one in 1985, then from 1987 through 1991, hatched eighteen more, rearing eight. Finally, in 1986, the Stuttgart Zoo in Germany hatched and raised two.

As of May, 2006, the only specimens *ISIS* lists anywhere are eight at The Dallas World Aquarium. Three hatched there in 2002 and 2003. Five arrived from Europe in 2005. One of the imported pairs is very bonded, the male feeding the female constantly. And a hand-raised Dallas World Aquarium bred female, while initially showing discomfort at being paired with another imported male, now appears nicely bonded as well, so hopes are high.

Ecuador appears to be experiencing a greater degree of deforestation than most other South American countries. Since the Pale-mandibled Aracari is found only there, and in adjoining Colombia, it may potentially be threatened. A number of authorities have given it, and its obvious close relative, the Stripe-billed Aracari, full species rank.

However, Short and Horne (2001), pointing out hybridization in the wild between Stripe-bills and Pale-mandibles in one direction, and Stripe-bills and Northern Collareds in the other believe all should continue to be classified under *P. torquatus*.

Fiery-billed Aracari (*Pteroglossus frantzii*)

While Short and Horne (2001) claim Pale-mandibled and Stripe-billed Aracaris should only be recognized as subspecies of the Collared Aracari, they do accord full species status to bird which, bay all appearances, is far more similar to the Central American Collared Aracari. Like *P. t. torquatus*, *P. frantzii* possess a rusty “collar” at the nape of the neck, lacking in Pale-mandibles and Stripe-bills. At around 250g, it’s somewhat intermediate in size between *P. t. torquatus* and *P. t. erythropygius*. The two immediate visual distinctions are the uniquely-colored “fiery” upper mandible, and a broad red band across the underparts, with very little of the black seen in its Collared relatives. Not as immediately noticable (except to someone being bitten), is a rather remarkable difference in the “teeth” along the edge of the upper manible. Those of the Fiery-bill are much smaller and more numerous, and don’t present the rather Gothic “incised” appearance of those possessed by a collared.

The tiny range of this species, along the Pacific coast of Costa Rica, and a small portion of Panama, does not generally overlap with that of the Collared Aracari, though what appears to be a single wild-bred hybrid has been collected. It appears to have lost part of its original Panamanian range, though apparently secure in Costa Rica, where it is a target for ecotoursits.

From the 1940’s into the early 1970’s, Costa Rica was a major source of softbills for the bird trade, especially tanagers and manakins, and, most notoriously, Quetzals. However, I am not aware of any Fiery-billed Aracaris exported alive. The limited habitat along the Pacific shore was apparently outside the range of commercial trappers. As of May, 2006, *ISIS* lists two birds of unspecified sex at Zoologico Nacional Simon Bolivar, in Costa Rica’s Capital, San Jose.

Curl-crested Aracari (*Pteroglossus beauharnaesii*)

This, the most recognizable Aracari, was, for many years, given its own genus, *Beauharnaisius*. It is not a rare bird in its range, south of the Amazon, divided among Peru, Bolivia, and Amazonian Brazil. Aside from its unique cap of remarkably textured feathers, it is further distinguished by peculiar cheek feathers, with hardened black components, pale turquoise skin around the eyes, and the longest tail of any Aracari. I had the pleasure of showing Nick Atchinson, the Curator of Ardastra Gardens, his first Curl-crested Aracaris, at The Dalla World Aquarium. A native of Australia, he immediately remarked that they reminded him of Northern Rosellas. I can only agree.

While well known for years, especially from the pioneering scientist Henry Walter Bates’ (1863) engaging account of being mobbed by a flock, no Curl-crested Aracari left South America alive until 1960. In January of that year, the New York Zoological Park (Bronx

Zoo)acquired a single specimen, and announced its arrival as “a Great Bird Rarity” with some fanfare: “Our specimen is on exhibition in the Jewel room and is well worth a special visit” (Anon. 1960). Aviculturists have continued to think so. For many people, this species represents sort of a “Holy Grail”.

Through the 1960’s, and into ‘70’s, specimens were commercially exported from Peru, appearing in a number of collections in the U.S. and Europe, though never considered common place. Through the ‘80’s, it was unobtainable., and none were seen outside of South America. In the 1990’s, a few showed up in Europe, from whence some were sent elsewhere, including the San Diego Zoo, which received three pairs.

As previously mentioned, a pair of Curl-crests at the Los Angels Zoo produced three clutches of infertile eggs in 1974 (Rundel, 1976). I know of no further attempts at captive reproduction until 1996, when two chicks were parent-reared at Zoo Ohrada, at Hluboka nad Vltavou, in the Czech Republic (Kavkova & Kralickova, 1998). Interestingly, another Czech Zoo, at Dvur Kralove nad Labem, was successful in 1999 (Anon., 2000). This was the third collection to breed this species, as the San Diego Zoo had accomplished the first U.S. breeding in 1998. San Diego achieved multiple successes, sending offspring to the Riverbanks Zoo, in Columbia South Carolina, in 2001, where a partial second generation breeding took place in 2003 (Martin Vince, pers. com).

As of May, 2006, *ISIS* lists three U.S. Zoos holding Curl-crested Aracaris. One remains at the San Diego Zoo (which has relocated most of its birds to Riverbanks). Riverbanks Zoo (which hatched one so far this year) holds four pairs. The Dallas World Aquarium is indicated to have eight birds. In fact, there are now six pairs at the Dallas World Aquarium, mostly obtained in the last two years. One was received from Jurong Bird Park. Four came through a special Peruvian permit, through the efforts of Pargue de las Leyendas, the National Zoo of Peru, in Lima. Eight were received from Jerry Jennings, who, again by special Peruvian permit, has been allowed to export a number of birds, retaining twelve pairs for propagation at Emerald Forest Bird Gardens. All of the Dallas World Aquarium birds are set up, off exhibit, as individual pairs. Needless to say, every time one of the two pairs that I work with daily peer in a nest log, or get at all close to each other while perching, I I take immediate notice, but so far, no consistent pattern of reproductive behavior has been observed yet.. On the other hand, the female of one of the four pairs my wife works with has been spending a lot of time in its log...

Acknowledgements.

I am grateful to Daryl Richardson, Director of The Dallas World Aquarim, Dr. Cindy DiGesualdo, The Aquarium’s veterinarian, and Eric Arntzen, Special Projects Coordinator, for copious data. I am also indebted to Albert Earl Gilbert for generously providing a copy of Short & Horne (2001) (which he illustrated), hot off the press.

References

- Anon.** (1960) Behind the scenes. *Animal Kingdom/Bulletin of the New York Zoological Society*. 63:30-32.
- Anon.** (2000) International Zoo News. *International Zoo News*. 47:123
- Bates, H. & R. Busenbark** (1963) *Finches and soft-billed birds*. T.F.H. Publications.
- Bates, H.W.** (1863) *A naturalist on the river Amazons*. John Murray.
- Bragin, N.** (2003) *2003 North American Regional Studbook for Green Aracari*. The Denver Zoo.
- Iles, C.** (2004) Breeding the Green Aracari (*Pteroglossus viridis*). *Avicultural Magazine*. 110:167-169.
- Jennings, J.** (1983) First and second breeding of the Green Aracari. *AFA Watchbird* 9(No.6):29-30.
- _____. (1990) First captive breeding of the Collared Aracari. *AFA Watchbird* 17(No.2):4-7.
- _____. (2005) Toucans and their captive reproduction.
<http://www.emeraldforestbirds.com/AdditionalLitature.htm>
- _____. (2005) Black Neck Aracari.
<http://www.emeraldforestbirds.com/blacknecka2.htm>
- _____. (2005) Lettered Aracari.
<http://www.emeraldforestbirds.com/LetterdAracari.htm>
- Kavkova, R. & J. Kralickova** (1998) Breeding of Curl-crested Aracari (*Pteroglossus. beauharnaesii*) in Zoo Ohrada.
[www.nashvillexoo.org/piciformes/pdf/breedingCCaracari\(cs\).pdf](http://www.nashvillexoo.org/piciformes/pdf/breedingCCaracari(cs).pdf)
- Krussman, R.** (1991) A review of the 1990 avian breeding successes of a mixed species rain forest exhibit. *Avicultural Magazine* 97:25-34.
- Lindholm, J.H.** (2005) Softbill propagation in U.S. zoos: A thirty year perspective. *AFA Watchbird* 32(No.3):27-38.
- Low, G.C.** (1929) *List of the vertebrated animals exhibited in the gardens of the Zoological Society of London, 1828-1927*. Zoological Society of London.
- McConnell, M.J.** (1991) Fostering the Green Aracaris. *AFA Watchbird* 18(No.5):27.

- Norris, K.A.** (1977) Toucans, Toucanets and Aracaris. *IN Rutgers, A., K.A. Norris, & C.H. Rogers* (1977) *Encyclopedia of Aviculture, Vol.3* Blandford Press: 43-52.
- Pernalete, J.M.** (1989) Breeding the Black-necked Aracari (*Pteroglossus aracari*) at Barquisemeto Zoo. *International Zoo Yearbook* 28:244-246.
- Rundel, R.** (1976) Model breeding environments for toucans (*Ramphastidae*) at the Los Angeles Zoo. *International Zoo Yearbook* 16:106-108.
- Rutgers, A., K.A. Norris, & C.H. Rogers** (1977) *Encyclopedia of Aviculture, Vol.3* Blandford Press.
- Sclater, P.L.** (1883) *List of vertebrated animals now or lately living in the gardens of the Zoological Society of London – Eighth Edition.* Longmans, Green, Reader, and Dyer.
- Short, L.L & J.F.M. Horne** (2001) *Toucans, barbets, and honeyguides: Ramphastidae, Capitonidae and Indicatoridae.* Oxford University Press.
- Sibley, C.G. & J.E. Ahlquist** (1990) *Phylogeny and classification of the birds of the world.* Yale University Press.
- Sibley, C.G. & B.L. Monroe** (1990) *Distribution and tazonomy of birds of the world.* Yale University Press.
- Tongren, S.** (1989) *The birds of the National Zoo.* (Self published).
- Zahl, P.A.** (1953) Exotic birds in Manhattan's Bowry. *National Geographic* 103:77-98
- Zoological Society of London** (1959-1998) Species of birds bred in zoos and other institutions, 1959-1996. *International Zoo Yearbook.* 1-36.
- Zoological Society of London** (1967) List of animals received & List of donors of animals to the Society. *Annual Report 1967.* 38-53.
- Zoological Society of London** (1970) List of animals received. *Annual Report 1970.* 41-51.