

SOFTBILL PROPAGATION IN U.S. ZOOS: A Thirty Year Perspective

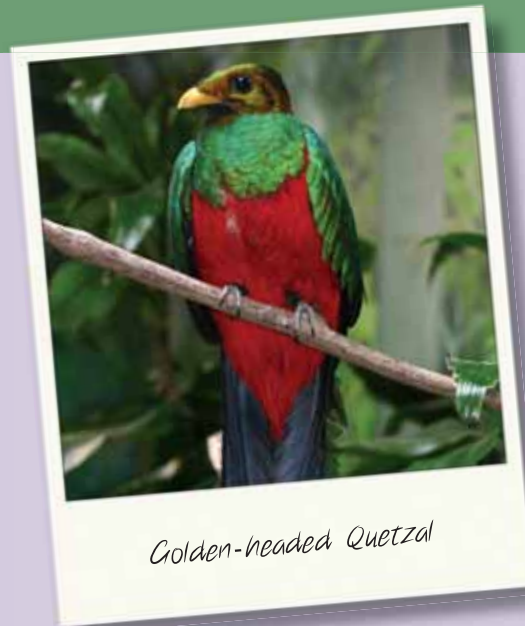
Part II – The ‘80’s

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If one compares the 1974 *International Zoo Yearbook* breeding records for softbills in U.S. zoos (published in the previous installment of this discussion) with those for 1985 (Table II), accompanying this section, the difference in breeding results for turacos is immediately striking. In 1974 four species hatched among five collections (Table I, Lindholm, 2005). Not all the institutions specified numbers produced, but at least fourteen were hatched. However, at least six of these died as juveniles. In 1985, 109 turacos, representing twelve species and subspecies, hatched among eighteen U.S. collections. Only 45 were indicated to have died before independence. In a way, this phenomenal difference between these two years is a microcosm of the dramatic improvement in U.S. Zoo softbill propagation that occurred over the time between them.

To appreciate the factors involved in this evolution, an examination of the Houston Zoo’s turaco program is revealing. Bob Berry began his fifteen year career as Curator of Birds at Houston in July 1972, one month before the Exotic Newcastle’s Disease bird export ban went into effect (Berry, 1981). Thus, one of his immediate concerns was preserving the diversity of a major bird collection in the face of possible unavailability of imported birds. Obviously this meant shifting priorities from maximum impact displays to enhancing reproduction. This was exemplified by his decision to rehouse the collection of turacos.

On his arrival, Bob was startled to find seventeen turacos of five species exhibited in Houston’s indoor walk-through aviary (40’ wide, 80’ long, and 20’ high) (Berry, 1979, 1981, & 1983). A single pair of White-cheeks was single-minded in their persecution of



*The first captive breeding of the Golden-headed Quetzal (*Pharomachrus auricles*) took place at the Houston Zoo in 1985 and they have been continuously kept there since 1981. Photo courtesy of the Houston Zoo*

the rest of their relatives, which did result in constant crowd-pleasing activity (Berry, 1981). Bob tells me it was only after warning that the zoo’s bird collection might someday consist primarily of “Zebra Finches, White Leghorn chickens, domestic pigeons, and canaries”, that he received permission to disrupt this entertaining spectacle. Shortly thereafter, the dominant pair of White-cheeks were the sole turacos in this aviary, and in 1973 parent-raised two chicks on exhibit (Berry, 1981). (Prior to this, the Houston Zoo had somehow managed to raise four turacos: A Gray Go-Away Bird in 1969 (from parents that were sent on loan to Houston Busch Gardens before 1974), and a Gray Go-Away Bird and a White-cheek in 1970 (Lindholm, 1987a)). Following the cessation of “Turaco Wars”, others species in the walk-through were able to breed as well, and by 1982, Fairy Bluebirds and Golden-breasted Starlings had hatched repeatedly (Berry, 1983), while the first Andean Cock of the Rock to be fully reared in captivity hatched there in 1979 (Berry, 1980, Berry et al, 1982).

The Violet-crested Turaco (Tauraco porphyreolophus) is one of many softbills whose first U.S. breeding took place at the Houston Zoo. Houston's first success was in 1979, and repeated a number of times in the 1980's. Photo by Andy Odum



Violet-crested Turaco

Meanwhile, pairs of Houston Zoo's other turacos had been distributed up and down a series of aviaries (7.5' wide, 15' deep, and 7-10' high) known as the Pheasantries, shared primarily with curassows and other cracids. (Berry, 1979 & 1981). Reproduction did not commence there until 1977 (Lindholm, 1987a), but that year, results were spectacular: Seven White-cheeks, five Red-crested, seven Schalow's, and two White-crested (each from a single pair of birds (Berry, 1979)), a grand total of 21, most parent-reared, some with assistance from siblings hatched earlier that season.

Successes on this scale continued at Houston for years. From 1977 through 19 May, 1982, 132 turacos of nine taxa had been reared to independence (Berry & Todd, 1982). As can be seen from Table II., 44 turacos of nine species and subspecies hatched there in 1985 alone – nearly half the U.S. total that year. At least partially second generation propagation is indicated for Gray Go-Away Birds, and Schalow's, Red-crested, and White-cheeked Turacos. By 1985, all twelve of the turaco taxa then present at the Houston Zoo had hatched chicks there (Lindholm, 1987a). Needless to say, a tremendous amount of data was documented, and several very useful papers were promptly published (Berry, 1979 & 1981, Berry & Todd, 1982). The publication of Houston's hand-rearing diet (Berry, 1979) was particularly valuable, and paved the way, not only for widespread zoo successes, but for the establishment of turacos in private aviculture. Indeed, by the late 1980s, Houston was deliberately limiting the number of various species of

turacos produced each year, as demand for captive-bred specimens fell, and birds bred by private aviculturists became increasingly available.

This explosive proliferation of captive-bred turacos across the U.S. during the 1980's is paralleled by softbill breedings in general. The total number of softbill taxa documented by the *International Zoo Yearbook* as having hatched in U.S. zoos in 1974 is 37 species hatched among 25 institutions (Lindholm, 2005, Table I), while the total for 1985 is 101 species and subspecies hatched among 56 collections (Table II). In general, the threat of a major decline in the availability of imported softbills prompted changes in husbandry and exhibit philosophy conducive to sustained propagation, resulting in a previously unimaginable abundance of captive bred specimens.

These efforts, of course, initially focused on sustaining the species already present in collections at the time of the initial Newcastle's import bans. However, as imports resumed, due to the institution of quarantine procedures (which resulted in much higher prices for birds than before), interest naturally turned towards establishing these species also. Five of the 109 turacos hatched in U.S. zoos in 1985 were Violet Plantain-Eaters. This would not lead one to imagine that in 2006, this species would be the second most well represented turaco in U.S. zoos, according to the International Species Information System. As of February, 2006, ISIS lists 66 specimens distributed among 29 collections. The only turaco held in larger numbers is its closest (but quite different looking) relative, the Ross' Turaco, with 76 specimens distributed among 31 institutions. The third and fourth most abundant U.S. zoo turacos are the White-cheeked, with 58 held among fifteen collections, and the Red-crested, with 51 held among nineteen places.

As will be noted from Table II, Ross', White-cheeked, and Red-crested Turacos were all hatched in some numbers in 1985: 13 Ross' among four collections, 17 White-cheeks among seven places, and 35 Red-crests among eight. Ross' Turaco breeding in U.S. zoos had commenced in 1979, at Houston. While the great British aviculturist Hubert Astley hatched Red-crested Turacos around ninety years ago, Jean Delacour (1925) writes "the young could not be reared". The first captive-bred Red-crested Turaco to survive beyond fledging hatched at the National Zoological Park, in Washington D.C. in 1969. That same year, White-cheeked Turacos hatched at the Dallas Zoo and the Pittsburgh Conservatory Aviary. Both of the Pittsburgh chicks died, but one of the Dallas birds was successfully reared. 1969 was the first year turacos hatched in a U.S. public exhibit (Lindholm, 1987a).

However, the first turacos hatched in the Western Hemisphere were White-cheeks of the red-crowned Southern subspecies (*T. leucotis donaldsoni*) (now apparently no longer in aviculture) reared at the Menlo Park, California aviaries of Alex Isenberg (1933), in 1932. The first American captive breeding of the bluish-green-crowned Northern subspecies (*T. l. leucotis*) (to which all American zoo-hatched birds belong) took place in the Trenton, New Jersey aviaries of Edward Marshall Boehm, where multiple successes occurred, commencing in 1963 (Everitt, 1973).

The Violet Plantain-Eater, on the other hand, was not hatched in North America until 1984, when five were hatched and raised at the Chicago Zoological Park (Brookfield Zoo) (Bent, 1988). A handful of specimens had been exhibited in U.S. zoos before the 1980's. The San Diego Wild Animal Park obtained a single, short-lived bird in 1971, while the St. Louis Zoo displayed the species more than fifty years ago (Vierheller & Conway, 1953). The Bronx Zoo exhibited it in the 1930's, and Lee Crandall, the long-time Curator of Birds there, considered it "perhaps most beautiful and certainly most rare" of the eight sorts of turacos likely to be displayed there then (Ditmars & Crandall, 1939). At any rate, when Violet Plantain-Eaters rather suddenly showed up on the market in 1981 (the year both Brookfield and Houston Zoo obtained their breeding birds), there was a great deal of interest from zoo and private aviculturists. This is definitely one of the more distinctive turacos, combining brilliant colors with a mildly grotesque appearance, vaguely suggesting the prehistoric. At the time, most people had only seen pictures.

The world's first captive breeding of Rhinoceros Hornbill (Buceros rhinoceros) took place at the Audubon Zoo in New Orleans in 1985. Restricted to the Malay Peninsula and the Greater Sundas, this bird is nearly threatened due to deforestation. Photo by Matt Schmit



Male Rhinoceros Hornbill

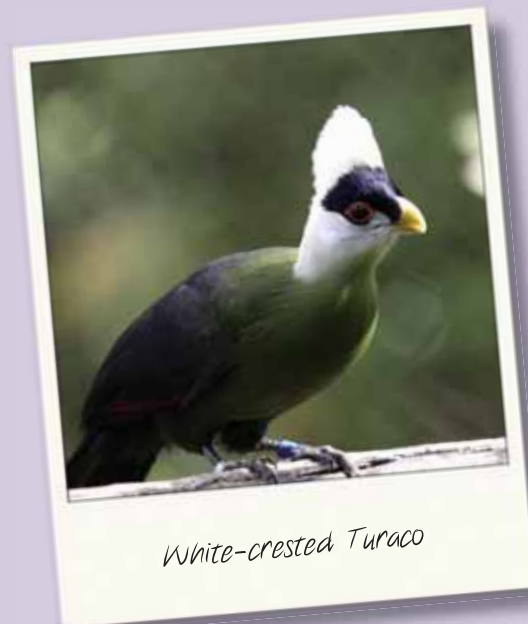
Through the rest of the 1980's, wild-caught Violet Plantain-Eaters continued to be commercially available, even as captive propagation expanded. This created a genetically unique situation, as far as turacos are concerned. The startling numbers of Ross', Red-Crested, and White-cheeked Turacos hatched since the mid-1970's are descended from a handful of wild-caught pairs. Angola, where the West African and South African subfaunal regions converge, was a major source of zoo turacos in the late '60's and early '70's. The Red-crested Turaco occurs nowhere else. So far as I know, Angola was the country of origin for all the Schalow's and Ross's Turacos in U.S. collections. This export ceased in 1974, when, after 491 years of Portuguese rule, Angola was granted independence, and promptly descended into 27 years of devastating civil war. Ethiopia was the source of founders of the U.S. White-cheeked Turaco population, and again, the bird trade in that country pretty much ended in 1974, following the deposition of the Emperor, Haile Selassie, and the imposition of a Marxist government.

The commercial importation of Violet Plantain-Eaters into the U.S. ended in 1993, but that was due to the implementation of the Wild Bird Conservation Act of 1992, enacted by the United States Legislature. This prohibited the commercial importation of most birds listed in any CITES appendix. In 1976, the republic of Ghana listed a major portion of its avifauna, including all its birds of prey, pigeons and doves, seed-eating passerines, and turacos, under Appendix III. Contrary to its title, the Convention on International Trade in Endangered Species does not restrict itself to animals in danger of extinction. Appendix III simply requires that any specimens of a designated organism from the country requesting the listing only be exported with proper authorization and documentation. This was of little consequence to American aviculture until the Wild Bird Conservation Act passed. At any rate, by the time Violet Plantain-Eaters no longer could be commercially obtained from the wild, there had been a twelve year window of opportunity, of which quite a number of zoos and private aviculturists availed themselves. That turacos in general may have extraordinary reproductive longevities, sometimes exceeding twenty years (Berry & Todd, 1982, Lindholm, 1987a, Todd et al, 1985), of course enhanced this advantage. The genetic health of the U.S. zoo Violet Plantain-Eater was further affected by the fact that this period began in 1981, when zoo turaco breeding had become widespread and fairly routine, coupled with the rise of ISIS, and greatly improved zoo record-keeping in general.

The end result is that the U.S. zoo population of Violet Plantain-eaters is unique among the touracos for its genetic diversity. Only one other species of turaco is designated by the AZA for management as a Population Management Plan (PMP). At present, there are only 16 White-bellied Go-Away Birds held among six U.S. institutions. While this species was first bred in Alex Isenberg's collection in the 1930's, and the first zoo propagation occurred at the Bronx Zoo in 1975, initial juvenile mortality in zoos was almost total (Lindholm, 1987a, Todd et al, 1985), and the number of specimens hatched so far has been comparatively small (though Houston Zoo has bred it in multiple generations). However, wild-caught specimens continue to be available from Tanzania, and there is interest among both zoos and private aviculturists in working with this uniquely striking bird. Thus, with the promise of further founders available, it has been designated for a PMP. While only the Violet Plantain-eater and the White-bellied Go-Away Bird are presently considered worthwhile for studbook management under a PMP, other species of Turacos will of course continue to be valued for their beauty, visitor appeal, educational value, and ease of management, and continue to be exhibited and bred in U.S. zoos. It is amusing to note that things have come full circle from Bob Berry's early days at the Houston Zoo. For around a decade now, a popular exhibit at Mickey Ollson's Wildlife World Zoo, in Arizona, has been a walk-through aviary featuring turacos that may be fed by visitors. All are captive-bred, specifically raised by private breeders for this aviary. As of the end of 2005, Wildlife World exhibited seven Violet Plantain-Eaters, five Ross', three Gold Coast, 22 Red-crested, one White-crest, and 27 White-cheeked Turacos (almost half the U.S. zoo population). Thanks to the enormously successful breeding programs for turacos in the U.S., inaugurated in the '70's, exhibits of this sort can now be enjoyed as a celebration of avicultural achievement.

Along with the Violet Plantain-eater, other West African endemics, previously very rare, became frequently available for the first time in the 1980's. The Emerald Starling is found only in the savannas of Guinea, Sierra Leone, and the Ivory Coast. It was unknown to aviculture until 1954, when 26 were collected for the London Zoo in Sierra Leone by a then youthful David Attenborough, on the very first of what were to be his many BBC-sponsored expeditions (Yealland, 1955b). The first specimen in the U.S. was a bird collected by Charles Cordier, which, Marvin Jones informs me, arrived at the Philadelphia Zoo 6 April, 1955, and died there 9 April, 1973.

This starling remained a treasured rarity in collections until regular importations from Guinea commenced in



The first U.S. breeding of the White-crested Turaco (Tauraco leucolophus) took place at the Houston Zoo in 1977. In 1985 it was one of nine taxa of turacos hatched at Houston. Photo by George Craig

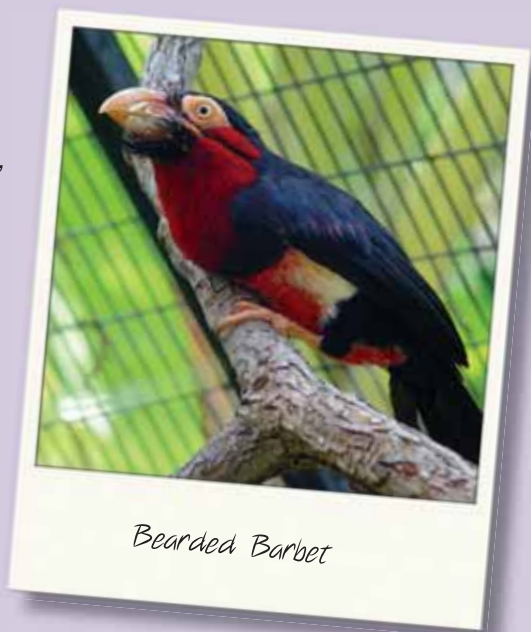
1979, first to Europe, then the U.S. The world's first breeding took place in 1980, at Chestnut Lodge, the British aviaries of Raymond Sawyer and Ruth Ezra. The first U.S. breeding took place at the Philadelphia Zoo in 1981. In the first several years of the '80's, a number of American zoos acquired this species, and multiple breeding successes soon followed. The Emerald Starling is not listed on any CITES appendix, so importations continue on a small scale, though a significant portion of the U.S. Zoo population is captive-bred. From none at all in the U.S. in 1980, numbers grew so that by 30 June, 1992, Robert Webster found it to be the 15th most populous passerine species in North American zoos, with 56 specimens present. A year later, the U.S. zoo population stood at 81 (Lindholm, 1993a).

As of February 2006, ISIS catalogued 144 Emerald Starlings distributed among 28 collections, making it the most populous African Starling in U.S. institutions. This is startling, in light of the fact the Superb Starling, with a captive history dating back to 1923, is ridiculously easy to breed (Lindholm, 1993b). It will be noted from Table II, that while thirteen Emerald Starlings were hatched among three U.S. collections in 1985, that same year 87 Superb Starlings hatched among fourteen collections. Five of these places had breedings from at least one captive bred parent. In 1974, 19 were hatched among five collections (Lindholm, 2005, Table I.). The earliest *International Zoo Yearbook* (Zoological Society of London, 1959-1998) record for the U.S. is for the Bronx Zoo in 1961. On 30 June, 1993, ISIS inventoried 173 specimens among 45 institutions, making it the second most populous passerine bird in U.S. zoos, after the Bali

Mynah. The February 2006 ISIS statistics for Superb Starlings show 124 specimens distributed among 37 places, making it only the third most abundant African Starling in U.S. zoos. Second place is taken by the Royal or Golden-breasted Starling (*Cosmopsarus regius*) with 136 specimens distributed among 35 collections.

As one would gather from their names, Superb and Royal Starlings are glorious creatures, standing out at once to zoo visitors who might otherwise not be inclined to be impressed by birds. Unfortunately, the Superb Starling, and to a somewhat lesser extent, the Royal Starling, can be dangerously aggressive trouble-makers in community aviaries, especially when nesting (sometimes an almost perpetual situation with Superb Starlings). While breeding pairs of Emerald Starlings can be dangerous to members of their own species (Congdon, 2002, Pyper, 1994), they have generally proved to be far better inhabitants of mixed species exhibits. Another disadvantage presented by the Superb Starlings is the rather undocumented genetics of the U.S. avicultural population. Because this species was already bred in numbers before proper record keeping became widespread, and because several collections were spectacularly successful and distributed their offspring widely, the ancestry of the current population is largely uncertain and not particularly diverse, making a studbook keeping a not terribly profitable procedure, so like some of the above-mentioned turacos, the Superb Starling is not a PMP species, despite its hardiness, fecundity, and continuing popularity.

An extreme rarity in American Zoos until the 1980's, the Bearded Barbet (Lybius dubius) is now the most well represented barbet in American zoos. The first U.S. breeding took place at the San Diego Wild Animal Park in 1989. Photo by Matt Schmit



The Emerald and Royal Starlings are the only PMP-managed African Starlings. While sharing a similar, if dryer range to the Superb Starling, the Royal Starling was a rare bird in American zoos until the mid-1970's, when numbers were exported from Tanzania, with wild-caught birds continuing to be occasionally available. Hybrids with Superb Starlings were produced at Edward Marshall Boehm's aviaries in the 1960's (Everitt, 1973) and at the San Francisco Zoo in 1972. However, to my knowledge, the first U.S. breeding of pure Royal Starlings occurred at the Bronx Zoo in 1977, with Lincoln Park and Houston achieving success not long after. Royal Starlings, however, have not proved prolific, though some collections have enjoyed sustained production. It will be noted from Table II that none hatched in 1985. Consistent success was achieved in the '90's, when record keeping had by then become standard practice.

While displaced to some extent by Emerald Starlings, Superb and Royal Starlings continue to hold their own as American zoo animals. Some other African Starlings have not fared so well. From Table II, it can be seen that in 1985 the Purple Glossy Starling did almost as well as the Emerald Starling, with eleven hatched among three collections (as opposed to thirteen Emeralds among three places). This handsome bird is abundant in the wild, very hardy, and not listed on any CITES appendix. The same can be said for Rueppell's and Blue-eared Glossy Starlings, which as can be seen from Tables I (Lindholm, 2005) and II, were hatched both in 1974 and 1985. At the end of 2005, ISIS lists a single Rueppell's, at the Living Desert, which acquired it from the San Diego Wild Animal Park where it hatched over twenty years ago. The last Blue-eared Starlings are sixteen, scattered among the Los Angeles, Santa Barbara, and San Diego Zoos. I have reason to believe these birds are likely all at least twenty years old. Likewise, I suspect most of the 20 Purple Glossy Starlings listed by ISIS for the end of 2005, to be found among seven collections, are mostly aged birds, with the possible exception of the six at Miami Metrozoo. One disadvantage which Purple, Blue-eared, and Rueppell's Glossy Starlings share is that they are all birds of rather uncertain temper, not ideal for mixed species exhibits. Another disadvantage is that, while brilliantly colored, they largely have all the pattern of a soap bubble. These birds shimmer with purple, green and blue, but not in any particular arrangement. Emerald, Royal, and Superb Starlings all possess unmistakable patterns that make them unforgettable.

Thus it happens that some U.S. zoo populations decline because, for all practical purposes, they go out of style. In these days of collection plans and

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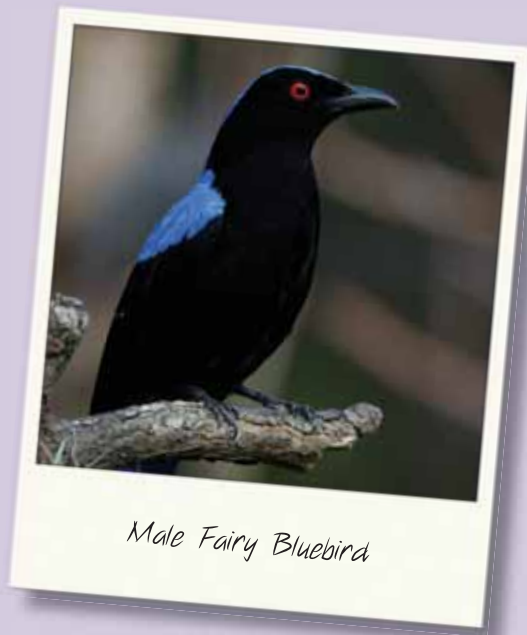


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In 1968, the Houston Zoo was the first U.S. zoo to breed Fairy Bluebirds (*Irena puella*). During the 1980's, propagation occurred every year and 180 chicks were raised throughout nineteen U.S. zoos. Photo by Paul Bratescu



Taxon Advisory Groups, simply because something can be bred like crazy does not in itself justify establishing a self-sustaining population. A case in point is the Levillant's (or Crested) Barbet. As of the end of 2005, ISIS lists one male specimen at Milwaukee, and another at Topeka. This was not an outcome one would have predicted in 1985 (Table II). Forty-two hatched that year, among five collections, and 29 were successfully reared. The ones hatched in Bloomington, Illinois had at least one captive-bred parent.

In all, from 1980 through 1989, the *International Zoo Yearbook* (Zoological Society of London, 1959-98) lists 268 hatched, with only 68 listed as juvenile mortalities. This propagation occurred among 14 U.S. institutions, of which five indicated at least partial second-generation breedings. Several places stand out. The Louisiana Purchase Zoo, in Monroe, commenced hatching Levillant's Barbets in 1980, rearing some every year through 1985, producing a total of 46, of which 31 were fully raised. Propagation of this bird at the Pittsburgh Conservatory Aviary began in 1981. Through 1988 32 hatched and all but one were reared. The North Carolina Zoological Park at Asheboro started breeding this species in 1983, when two hatched. The next year 22 hatched, of which only one died before independence. None hatched in 1985, but reproduction occurred each year from 1986 through 1988, with a total of 20 hatched and nineteen reared.

The single most productive year for this species was in 1988, when seven U.S. collections hatched 52 and raised 41. After that, things sort of collapsed. In 1989

four zoos hatched 28 and reared only fifteen. In 1990 four places produced twelve, rearing ten. The next year five hatched among three places, and four were reared. In 1992 and 1993, only single U.S. zoos bred it, hatching and raising one each time. In 1996, the year I will be examining in depth in the next installment of this discussion, none hatched.

What happened? Levillant's Barbet is not on any CITES index. Throughout the decline of the U.S. zoo population specimens could have been procured from Tanzania. I believe they could be obtained now. I can see several reasons for this collapse. This barbet is a widespread bird, whose propagation is of no real conservation significance. While interesting looking, it's not spectacular, and its combination of red, yellow, black, and white is not visually arresting. The most compelling reason for this fall from grace is this bird's rather aggressive, somewhat predatory behavior. This species was not totally reliable in mixed company, and furthermore, fledgling chicks and eggs are a natural part of its diet. Finally, the end of the '80's and the beginning of the '90's saw the importation of all sorts of other barbets from Africa, and many are more obviously attractive.

Today, the two barbet species for which PMP's have been established are both brilliantly colored, and neither are quite as formidable with other birds. The East African Red-and-Yellow Barbet bred on and off at Denver over the decade from 1978 through 1988, including the year under consideration (Table II). It remains available from Tanzania. The brilliantly colored and quite weird-looking Bearded Barbet (*Lybius dubius*), like the Violet Plantain-Eater and the Emerald Starling, is another formerly rare West African species which became frequently available in the '80's and remains so. It was not bred in the U.S. until 1989, when the San Diego Wild Animal Park hatched four, but has been hatched at several places since then. The fact that, with 34 specimens distributed among fifteen collections, it is now the most well represented barbet in U.S. zoos is partially due to continuing importations, but there is a substantial proportion of captive-bred birds.

The Common Hoopoe, in any of its subspecies, has always been in demand as a zoo animal, especially since commercial importations were prohibited in the 1970's, following its listing as a U.S. migratory bird, due to a single specimen shot on one of the Aleutian Islands. So it was certainly not lack of interest that led to the complete extinction of the line of European Hoopoes that bred so prolifically in 1985, when 31 hatched, and 21 were reared. Rather, collapse in this case resulted from a combination of genetics

and pathology. In 1981 the National Zoological Park received Hoopoes from Israel, from Tel Aviv University. According to the *International Zoo Yearbook*, from 1982 through 1986, 72 were hatched in Washington D.C., and 41 of these were successfully raised. The 1985 Bronx Zoo hatching of nine was the first hatching in another collection. In 1986, the Bronx Zoo, the Miami Metrozoo, and the Pittsburgh Conservatory Aviary together hatched eighteen and reared fourteen. In 1987 the same three places produced ten, but only the seven hatched at New York were reared. For 1988, the *IZY* lists four that hatched and survived at the Bronx Zoo, and two that hatched, but died, at the Pittsburgh Aviary. That was the last year European Hoopoes hatched in North America. The earliest ISIS abstract I have at hand is for 30 June, 1992. Three Common Hoopoes were then present in the U.S.: One each at the San Diego Wild Animal Park, Kansas City, and the Bronx. One might imagine some disaster had occurred – and so it had. In late 1987 the National Zoo destroyed all its hoopoes when they tested positive for Avian Tuberculosis. I do not know why breedings ceased elsewhere after 1988. Perhaps inbreeding finished where TB left off.

If the eventual demise of the U.S. zoo population of Levaillant's Barbet and the European Hoopoe was not apparent from the 1985 *IZY* breeding statistics, the status of other birds often has followed the direction implied by the breeding results for that year. Pied Imperial Pigeons, Tawny Frogmouths, Speckled Mousebirds, Kookaburras, Blue-crowned Motmots, Lilac-breasted Rollers, Green Wood Hoopoes, Red-billed Hornbills, White-crested Laughing Thrushes, and Plush-capped Jays are all managed as PMP's today, fulfilling, to some degree, the promise of twenty years ago. Toco Toucans are managed at a more organized level, as an SSP (Species Survival Plan). Another SSP bird was hatched for the first time in captivity in 1985. The Rhinoceros Hornbill hatched at the Audubon Park Zoo that year appears to have been eaten by its parents at about two weeks of age (Reilly, 1988). However, the two that hatched there in 1986 were fully reared, and complete success was achieved the next two years as well. These four years are discussed in the detail one would hope for in the *International Zoo Yearbook* (Reilly, 1988).

Another 1985 first captive breeding was also the first breeding for any member of its family outside its native range. In 1940, the Costa Rican Quetzal (*Pharomachrus mocinno costaricensis*) was bred in a Costa Rican private aviary (Delacour, 1943), and in 1955 Cuban Trogons (*Priotelus temnurus*) nested at the Pittsburgh Conservatory Aviary (Hawkins, 1955), but do not appear to have produced chicks. However, the

first trogon of any sort hatched in a public zoo was the Golden-headed Quetzal (*Pharomachrus auriceps*) at the Houston Zoo. Appropriately for such a taxonomically significant breeding record, Bob Berry (1987) published a highly detailed report of the hand-rearing of the survivor of the two chicks hatched in 1985, and two of the three hatched in 1986. Rather astoundingly, Houston has now worked continuously with this species since 1981 (Berry, 1987), acquiring several more wild-caught specimens, and providing other American zoos with birds hatched there. Reproduction has so far occurred only at Houston, where more than a dozen have hatched, the most recently a few months ago. While Bolivia, where 1980's exports originated from, is now closed to export, occasional birds are available from Peru. Thus, though the Golden-headed Quetzal's status remains tenuous, with eleven distributed among four U.S. zoos at the end of 2005, there is reason to believe this beautiful species will continue as a feature of American public exhibits.

A taxonomically interesting 1985 record is the world's first captive breeding of Pale-legged Ovenbirds at the Bronx Zoo. Of the more than 200 species that comprise the Central and South American family Furnariidae, only a tiny fraction have been kept in zoos, and only this species has ever been propagated. The Bronx Zoo and San Diego Zoo received specimens from Bolivia in 1983, part of the final shipments from the then 85 year old Charles Cordier, whose American zoo involvement began with the shipment of the first Andean Cocks of the Rock in captivity to the Bronx in 1941 (Lindholm, 1988). It happens that Bronx Zoo's record of achieving the only successful



Photo by Paul Bratescu

Female Fairy Bluebird

captive breeding of a species of Formicariidae (another Central and South American family of primitive passerines, again with more than 200 species) in 1974, also involved specimens collected by Cordier (Bell & Bruning, 1976, Lindholm, 1988). A pair at San Diego constructed a spherical earthen nest (for which ovenbirds are named) in 1984, only to have it wrecked by Plush-capped Jays. Bronx Zoo's hatching of six and rearing of five in 1985 and rearing of three out of four hatched in 1986 remain the only captive breeding records for the family of which I am aware. As of the end of 2005, there were none in North America, but ISIS lists Pale-legged Ovenbirds at four European Zoos, and 17 specimens at the Jurong Bird Park in Singapore, so future U.S. zoo work with this species remains a possibility. As zoo birds, ovenbirds appeal primarily to people with some knowledge of ornithology, as they are brown and thrush-like, though their nests would be of general public interest.

By 1985, the impending extinction of some previously successful breeding programs was already fairly clear. None of the Renault's (or Coral-billed) Ground Cuckoos hatched that year survived. The status of this large and picturesque bird had seemed promising a few years earlier (Lindholm, 1987b). 1977 was the year captive breeding commenced in North America, when both Toronto (Atkinson, 1982) and Philadelphia (Wylie & Shelton, 1982) were successful. From 1977 through 1982, Philadelphia bred this bird every year, hatching 46 and rearing 21. Full second generation breedings were achieved from 1980 through 1982 (Lindholm, 1987b, Wylie & Shelton, 1982). From 1977 through 1981, Toronto also bred Renault's Ground Cuckoos each year, rearing fifteen out of 34 hatched. Commencing in 1983, the San Diego Zoo hatched chicks from a male hatched in Philadelphia in 1979, and a female hatched in Toronto in the '70's (Lindholm, 1987b). Twelve chicks hatched at San Diego in 1983, but only two were reared. Four hatched in 1986, one surviving. At least two chicks survived in 1987. At the Riverbanks zoo in 1986, a pair on loan from Philadelphia, where they had hatched, produced three chicks (Lindholm, 1987b). Ten chicks that hatched at the National Zoological Park from 1980 through 1982, only two of which survived, were all from captive-bred parents (Lindholm, 1987). Unfortunately, the fact that all the founder Renault's Ground Cuckoos had been imported no later than 1974 (Atkinson, 1982 Wylie & Shelton, 1982) and that Philadelphia and Toronto were the only North American zoos to breed from wild-caught specimens, led to an eventual decline. As of the end of 2005, ISIS indicates that Toronto, Honolulu, the San Diego Zoo and the National Aviary at Pittsburgh each held a single specimen.

1985 was the next to the last year that White-necked Picathartes were hatched in the U.S. While all seven that hatched at the San Antonio Zoo that year died, the last one hatched outside of Africa, at San Antonio in 1987, died 1 January, 1989 (Jones, 2004). Of the six hatched in San Antonio in 1984, five died that year, but one died in 1998, then the last of its species outside of Africa (Jones, 2004). This remarkable looking and taxonomically enigmatic bird was kept in captivity for the first time in 1954, when a single bird was brought to the London Zoo by the BBC's "Zoo Quest to Sierra Leone", led by David Attenborough, the same expedition which introduced the Emerald Starling to aviculture (Yealland, 1955a). The subsequent captive history of this species has been exhaustively documented by the preeminent zoo historian Marvin Jones (2003a&b, 2004) in a series of installments in the *Avicultural Magazine*. It was not long before professional collectors began offering specimens for sale. The first in North America were three purchased by the Bronx Zoo in 1959 by the Dutch dealer G. Van den Brink. Through 1972, a total of 56 were obtained from various dealers by a total of eleven U.S. zoos. The last shipment, five birds received by the San Antonio Zoo, arrived 12 July, 1972, less than a month before the U.S. government imposed the Exotic Newcastle's disease import ban. The White-necked Picathartes, always regarded as a rarity, was placed on both CITES Appendix I (prohibiting commercial trade by convention participants) and the United States Endangered Species List in 1973. Thus when the importation of birds into the U.S. through quarantine stations became possible, it was only allowed through a permit from the U.S. Department of the Interior. Such a permit was granted, in 1975, to a consortium of seven zoos to import a total of 30 specimens from Liberia, but by the time the permit was approved, the Danish dealer who had collected them had already sold them to European collections (Jones, 2004). The same Danish dealer continued to send birds from Liberia to European Zoos through 1978. Apparently, the collection of nestlings for the bird trade resulted in the abandonment of several breeding colonies in Liberia (Fry et al, 2000). At present, this West African endemic species is considered vulnerable to extinction, with a declining population estimated at no more than 10,000 birds (Birdlife International, 2000), the major threat being habitat destruction. Recent political instability in Liberia, Sierra Leone, and the Ivory Coast can not have helped matters.

As with the Bali Mynah (Lindholm, 2005), there was of course interest in breeding this "Endangered Animal" in captivity. However, while success was achieved in Europe by the 1960's (Jones, 2003b), the first U.S. captive breeding did not take place until 1973, when

the Memphis Zoo hatched two on 14 September, both dying four days later (Jones, 2004). All other U.S. breedings took place at the San Antonio Zoo, which, from 1960 through 1972, purchased at least eighteen wild-caught birds. From 1979 through 1987, San Antonio hatched 21, only three living more than two months (Jones, 2004). The single 1979 bird hatched in an incubator (the egg having been laid on the ground), and was hand-reared (McKelvey, 1981). This bird died in 1988 (Jones, 2004). Both 1981 birds were also hatched in an incubator. Their hand-rearing is described in great detail by Solomon & Mills (1983). While one chick died at 28 days, the other lived more than three years (Jones, 2004). None of the four hatched in 1983 lived as long as a month. Aside from the one which died in 1998, none of the six hatched in 1984 lived much longer than a month. As previously mentioned, none of the seven hatched in 1985 survived. (This figure is from the *International Zoo Yearbook*. The zoo records from which Marvin Jones (2004) worked, mentioned only one chick.) And in 1987 a single chick hatched, which died in 1989. 1987 was also the year San Antonio's last male bird died, thus ending the breeding program.

A program to propagate another endangered bird met with its first successes in 1985. No Guam Kingfishers had been hatched in captivity previously, but that year the Bronx Zoo, Philadelphia, and the National Zoological Park were all successful. In 1981 the wild population was estimated at 3,000. In 1984, the year 21 were collected, the first in captivity, fewer than 50 were thought to exist. Eight were added to the captive population in 1986. In 1988 the last sightings of wild Guam Kingfishers were recorded. This decline was entirely due to the establishment of Brown Tree Snakes, accidentally introduced by military transport, from Manus in the 1940's which otherwise resulted in the complete extinction of five Guam endemic birds between 1983 and 1986, as well as the extinction in the wild of the Guam Rail.

At any rate, four years after bringing Guam Kingfishers into captivity, a consortium of American Zoos, led by Philadelphia, found itself entirely responsible for the continued existence of this distinctive subspecies. For the first five years, the population grew steadily, despite fairly high chick mortality. A Studbook, kept then as now by Beth Bahner of the Philadelphia Zoo, was established in 1986, and the program was designated a Species Survival Plan in 1988. By 1990 there were 65 birds in 21 U.S. facilities. However, by 1992, the number had fallen below sixty. By 1993 only three of the wild-caught kingfishers remained alive (Jaffe, 1994). Only sixteen of the 29 birds collected in 1984 and 1986 became founders of the current population.

(Bahner & Lynch, 2005). Tuberculosis was discovered in seven specimens among four U.S. facilities by 1992 (Jaffe, 1994). From 1992 through 1998, the population remained below 60. Beginning in 1999, however, there was a consistent increase in numbers, accelerating after 2003 (Bahner & Lynch, 2005). In October 2005, there were 80 Guam Kingfishers distributed among eleven U.S. collections and a facility on Guam. In February 2006, the U.S. zoo population stood at 75, distributed among twelve institutions. ISIS indicates twelve hatchings occurred among five places over the previous six months. At the time of the AFA's founding in 1974, the idea that a consortium of zoos might maintain a growing population of a taxon of soft-billed bird eighteen years beyond its extinction in the wild might be greeted as wishful thinking, if not science fiction. The fact that such is now reality indicates the progress made since then, the evidence of the efforts of many individuals and institutions.

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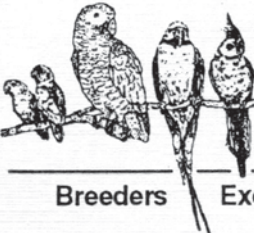
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TABLE II.

Softbilled Birds hatched in U.S. Zoos and Related Institutions in 1985, as documented by the *International Zoo Yearbook* (Olney et al, 1988). Numbers in parentheses indicate juvenile mortality. An asterisk indicates at least one parent is captive-bred.

Sulawesi Superb Fruit Dove (<i>Ptilinopus superbus temmincki</i>) Philadelphia	1(1)
Pied Imperial Pigeon (<i>Ducula bicolor</i>) Boston (Franklin Park) Minneapolis (Minnesota Zoological Garden) Pittsburgh Aviary	3 5(1) 3*
Gray Go-Away Bird (<i>Corythaixoides concolor</i>) Houston Zoo	10(6)*
White-bellied Go-Away Bird (<i>Corythaixoides leucogaster</i>) Houston Zoo	7(6)
Violet Plantain-Eater (<i>Musophaga violacea</i>) Chicago (Brookfield) Houston Zoo	3 2(2)
Ross's Turaco (<i>Musophaga rossae</i>) Buffalo Houston Zoo San Diego Zoo Tampa (Busch Gardens)	5(1) 2(2) 4 2
Gold Coast Turaco (<i>Tauraco corythaix persa</i>) Tampa (Busch Gardens)	4
Sierra Leone Turaco (<i>Tauraco corythaix buffoni</i>) Houston Zoo	4(2)
Schalow's Turaco (<i>Tauraco corythaix schalowi</i>) Houston Zoo	5(4)*
Red-crested Turaco (<i>Tauraco erythrolophus</i>) Columbia (Riverbanks) Houston Zoo Memphis New York (Bronx Zoo) Oklahoma City Sacramento San Antonio Tampa (Busch Gardens)	6(2) 9(4)* 6(5) 4(1) 2* 2* 3(2) 3
Hartlaub's Turaco (<i>Tauraco hartlaubi</i>) Monroe (Louisiana Purchase) Philadelphia	4(3) 2
White-cheeked Turaco (<i>Tauraco l. leucotis</i>) Fresno Houston Zoo New York (Bronx Zoo) Orlando (SeaWorld) Pittsburgh Aviary Tampa (Busch Gardens) Toledo	1(1) 4(3)* 4(1) 4 1 1 1



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White-crested Turaco (<i>Turaco leucolophus</i>)		Pittsburgh Aviary	4
Buffalo	1	San Diego Zoo	2(2)
Houston Zoo	1	Seattle	8
Violet-crested Turaco (<i>Tauraco porphyreolophus</i>)		Southern Lilac-breasted Roller (<i>Coracias c. caudata</i>)	
Tampa (Busch Gardens)	3	Boston (Franklin Park)	2*
Roadrunner (<i>Geococcyx californiana</i>)		Columbia (Riverbanks)	2*
Fort Worth	2(2)	New York (Bronx Zoo)	3(1)*
Hershey (ZooAmerica)	5(1)	Philadelphia	2(1)
Pittsburgh Aviary	6*	Pittsburgh Aviary	5*
Sacramento	2(2)	San Antonio	7(7)*
Renauld's Ground Cuckoo (<i>Carpococcyx renauldi</i>)		European Hoopoe (<i>Upupa e. epops</i>)	
Philadelphia	6(6)	New York (Bronx Zoo)	9(1)
		Washington DC (National Zoological Park)	22(9)*
Tawny Frogmouth (<i>Podargus strigoides</i>)		Eastern Green Wood Hoopoe (<i>Phoeniculus purpureus marwiti</i>)	
Columbia (Riverbanks)	2*	Monroe (Louisiana Purchase)	4
Kansas City	4(3)*	New York (Bronx Zoo)	13(2)*
New York (Bronx Zoo)	2	Philadelphia	2
Oklahoma City	1		
Pittsburgh Aviary	1	African Gray Hornbill (<i>Tockus nasutus</i>)	
Speckled Mousebird (<i>Colius striatus</i>)		Cincinnati	2(1)
Albuquerque	5*	Pittsburgh Aviary	7
Denver	19(15)	Northern Red-billed Hornbill (<i>Tockus e. erythrorhynchus</i>)	
Memphis	10(3)	Brownsville (Gladys Porter Zoo)	3
Milwaukee	1(1)*	Honolulu	4
Pittsburgh Aviary	5(1)*	Kansas City	3*
San Antonio	2(2)	Philadelphia	4*
San Diego Zoo	1(1)*		
Tulsa	2(1)*	Von der Decken's Hornbill (<i>Tockus deckeni</i>)	
Wichita	3(1)	Abilene	1
Blue-naped Mousebird (<i>Colius macrourus</i>)		Jackson's Hornbill (<i>Tockus jacksoni</i>)	
Kansas City	3(1)	San Antonio	3
Golden-headed Quetzal (<i>Pharomachrus auriceps</i>)		Southern Pied Hornbill (<i>Anthracoseros a. albirostris</i>)	
Houston Zoo	2(1)	Columbia (Riverbanks)	2
		New York (St. Catherine's Island)	1
African Pygmy Kingfisher (<i>Ispidina picta</i>)		Rhinoceros Hornbill (<i>Buceros rhinoceros</i>)	
San Antonio	8(8)*	New Orleans (Audubon Park)	1(1)
Kookabura (<i>Dacelo novaeguineae</i>)		Northern Ground Hornbill (<i>Bucorvus abyssinicus</i>)	
Chicago (Brookfield)	2	Dallas	2
Denver	5(1)		
Los Angeles	4(1)	Scarlet-crowned Barbet (<i>Capito aurovirens</i>)	
Louisville	1	Chicago (Brookfield)	6
New York (Bronx Zoo)	3(1)*		
Pittsburgh Aviary	2	Toucan Barbet (<i>Semnornis ramphastinus</i>)	
St. Louis	1	New Orleans (Audubon Park)	5(4)
San Antonio	2*		
Gray-headed Kingfisher (<i>Halcyon leucocephala</i>)		Black-collared Barbet (<i>Lybius torquatus</i>)	
Chicago (Brookfield)	11(1)*	Pittsburgh Aviary	3(1)
Guam Kingfisher (<i>Halcyon c. cinnamomina</i>)		Levaillant's Barbet (<i>Trachyphonus vaillanti</i>)	
New York (Bronx Zoo)	6(4)*	Bloomington (Miller Park Zoo)	6*
Philadelphia	1	Denver	6(3)
Washington DC (National Zoological Park)	4(1)	Monroe (Louisiana Purchase)	15(8)
Blue-crowned Motmot (<i>Momota momota</i>)		Pittsburgh Aviary	8
Boston (Franklin Park)	5(1)	Toledo	7(2)
Denver	1	Red-and-Yellow Barbet (<i>Trachyphonus erythrocephalus</i>)	
New Orleans (Audubon Park)	4	Denver	4(1)

d'Arnaud's Barbet (<i>Trachyphonus darnaudi</i>)	
Denver	9(2)
Pale-mandibled Aracari (<i>Pteroglossus torquatus erythropygius</i>)	
New Orleans (Audubon Park)	3(2)
Pittsburgh Aviary	2(1)
Saffron Toucanet (<i>Bailloni bailloni</i>)	
Lake Monroe (Central Florida Zoo)	4(2)
Plate-billed Mountain Toucan (<i>Andigena laminirostris</i>)	
New Orleans (Audubon Park)	2(2)
Toco Toucan (<i>Ramphastos toco</i>)	
Columbia (Riverbanks)	3
Omaha	1(1)*
San Diego Zoo	5(1)
Santa Barbara	2(1)
White Woodpecker (<i>Melanerpes candidus</i>)	
St Louis	2
Pale-legged Ovenbird (<i>Furnarius leucopus</i>)	
New York (Bronx Zoo)	6(1)
Hooded Pitta (<i>Pitta sordida</i>)	
Philadelphia	11(6)
Red-vented Bulbul (<i>Pycnonotus cafer</i>)	
Dallas	5(4)
Kansas City	2(1)*
Minneapolis (Minnesota Zoological Garden)	2
Fairy Bluebird (<i>Irena puella</i>)	
Denver	1
Philadelphia	1
Pittsburgh Aviary	1(1)
Black-headed Gonolek (<i>Laniarius barbarus erythrogaster</i>)	
Denver	7(4)
Cactus Wren (<i>Campylorhynchus brunneicapella</i>)	
Tucson (Arizona-Sonora Desert Museum)	2
White-browed Robin-Chat (<i>Cosypha heuglini</i>)	
New York (Bronx Zoo)	2*
Blue-shouldered Robin-Chat (<i>Cosypha cyanocampter</i>)	
Chicago (Brookfield)	2(1)
Magpie-Robin (<i>Copsychus saularis</i>)	
Kansas City	10(7)*
Minneapolis (Minnesota Zoological Garden)	1(1)
Pittsburgh Aviary	7
San Antonio	6(6)
White-rumped Shama (<i>Copsychus malabaricus</i>)	
Asheboro (North Carolina Zoological Park)	5(3)*
Kansas City	3(3)*
San Antonio	3(1)*
Eastern Bluebird (<i>Sialia sialis</i>)	
Minneapolis (Minnesota Zoological Garden)	1



Long-billed Scimitar Babbler (<i>Pomatorhynchus hypoleucos</i>)	
San Diego Zoo	3(3)
Arrow-marked Babbler (<i>Turdoides jardineii</i>)	
San Antonio	1
White-crested Laughing Thrush (<i>Garrulax leucolophus</i>)	
Chicago (Lincoln Park)	3
Detroit Zoological Park	4
Los Angeles	2(2)
Minneapolis (Minnesota Zoological Garden)	15(12)
Washington DC (National Zoological Park)	3(3)
Crimson -Winged Laughing Thrush (<i>Garrulax formosus</i>)	
San Diego Zoo	14(3)
Silver-eared Mesia (<i>Leiothrix argentea</i>)	
Kansas City	3(2)*
Peking Robin (<i>Leiothrix lutea</i>)	
Asheboro (North Carolina Zoological Park)	3(2)*
Detroit Zoological Park	1(1)
Minneapolis (Minnesota Zoological Garden)	4(1)
San Diego Zoo	8(3)
Black-chinned Yuhina (<i>Yuhina nigrimenta</i>)	
Buffalo	4(4)
White-necked Picathartes (<i>Picathartes gymnocephalus</i>)	
San Antonio	7(7)
Yellow-tufted Honeyeater (<i>Meliphaga melanops</i>)	
San Diego Zoo	4(1)
White-lined Tanager (<i>Tachyphonus rufus</i>)	
Columbia (Riverbanks)	6(5)
Silver-billed Tanager (<i>Ramphocelus carbo</i>)	
Baltimore (National Aquarium)	6(2)
Washington DC (National Zoological Park)	1(1)
Brazilian Tanager (<i>Ramphocelus bresilius</i>)	
Philadelphia	4(2)
Blue-gray Tanager (<i>Thraupis episcopus</i>)	
Pittsburgh Aviary	5
Palm Tanager (<i>Thraupis palmarum</i>)	
Asheboro (North Carolina Zoological Park)	5(5)*

Orange-bellied Euphonia (<i>Euphonia xanthogaster</i>)		Bali Mynah (<i>Leucopsar rothschildi</i>)	
Philadelphia	1(1)	Asheboro (North Carolina Zoological Park)	5
San Diego Zoo	3(2)	Buffalo	2(2)
		Cincinnati	2(2)
Paradise Tanager (<i>Tangara chilensis</i>)		Cleveland	4(4)
Chicago (Brookfield)	1(1)	Denver	7(3)
		Kansas City	8(4)
Golden Tanager (<i>Tangara arthus</i>)		Montgomery	1(1)
Baltimore (National Aquarium)	1(1)	New York (Bronx Zoo)	5
Seattle	5(3)	Oklahoma City	5(3)
		Philadelphia	4(3)
Silver-throated Tanager (<i>Tangara icterocephala</i>)		San Diego Zoo	1(1)
Fresno	6	Santa Barbara	2(2)
Seattle	6(5)	Wichita (Sedgwick County)	2(1)
Blue-necked Tanager (<i>Tangara cyanicollis</i>)		Golden-crested Mynah (<i>Ampeliceps coronata</i>)	
Pittsburgh Aviary	2(1)	Buffalo	3(3)
Troupial (<i>Icterus icterus</i>)		Coleto (<i>Sarcops calvus</i>)	
Pittsburgh Aviary	3	San Diego Zoo	2(1)
Red-eyed Starling (<i>Aplonis panayensis</i>)		Hill Mynah (<i>Gracula religiosa</i>)	
Minneapolis	1	Denver	2(2)
Pittsburgh Aviary	2(1)		
		Grosbeak Starling (<i>Scissirostrum dubium</i>)	
Emerald Starling (<i>Lamprotornis iris</i>)		Denver	1(1)
Columbia (Riverbanks)	7(1)	Minneapolis	7(1)
Philadelphia	2		
Pittsburgh Aviary	4(1)	Satin Bowerbird (<i>Ptilonorhynchus violaceus</i>)	
		San Diego Zoo	1(1)
Purple Glossy Starling (<i>Lamprotornis purpureus</i>)			
Honolulu	6(5)	Central Superb Bird of Paradise (<i>Lophorina superba feminina</i>)	
New York (Bronx Zoo)	3*	San Diego Zoo	1
Pittsburgh Aviary	2		
		Beechey's Jay (<i>Cissilopha beecheyi</i>)	
Blue-eared Glossy Starling (<i>Lamprotornis chalybaeus</i>)		Houston Zoo	1(1)
Santa Barbara	2(1)		
		Plush-capped Jay (<i>Cyanocorax chrysops</i>)	
Rueppell's Glossy Starling (<i>Lamprotornis purpuropterus</i>)		New Orleans (Audubon Park)	2
Pittsburgh Aviary	3	San Diego Zoo	2
		Toledo	2(1)
Magpie Starling (<i>Speculipastor bicolor</i>)		Tulsa	4(1)*
Denver	1		
		Mexican Green Jay (<i>Cyanocorax yncas glaucescens</i>)	
Superb Starling (<i>Spreo superbus</i>)		Houston Zoo	3(3)
Albuquerque	1*		
Asheboro (North Carolina Zoological Park)	17(5)	Collie's Magpie Jay (<i>Calocitta formosa colliei</i>)	
Birmingham	3	Houston Zoo	1
Buffalo	9(4)		
Cleveland	6(3)*	Red-billed Blue Magpie (<i>Urocissa erythrorhynchus</i>)	
Colorado Springs	2(1)	Toledo	1
Fort Worth	14(12)	Wichita (Sedgewick County)	3(3)
Kansas City	2(1)*		
Pittsburgh Aviary	5(1)	Rufous Tree Pie (<i>Dendrocitta vagabunda</i>)	
San Antonio Zoo	7(5)*	San Antonio Zoo	6
Tampa (Busch Gardens)	6(1)		
Toledo	8(6)	American Crow (<i>Corvus brachyrhynchos</i>)	
Tyler	6	Duluth	2(1)
Wichita	1*		
		Pied Crow (<i>Corvus albus</i>)	
Wattled Starling (<i>Creotophora cinerea</i>)		Dallas Zoo	5(2)
Pittsburgh Aviary	2(2)		
Brahminy Mynah (<i>Sturnus pagodarum</i>)			
Buffalo	4(1)		