

Breeding, Husbandry and Management of Tanager Species

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The majority of tanagers are found from Costa Rica in Central America through the northern half of South America into Paraguay. Some species occur through Argentina (Skutch, 1954; Dunning, 1982). They inhabit the lower edge of coastal foothills and 4,000-7,000 feet elevations into the mountains. These mainly frugivorous birds roam through tropical forest tree tops and edges of forest clearings foraging for fruits, berries, small insects, and vegetation (Skutch, 1954). Many tanager species are brilliantly colored and their songs are generally short, sharp monosyllable chirpings. This chirping is especially evident when they are agitated, alarmed, or excited. The majority of tanagers are basically monomorphic, with the males a shade or more brighter than the females, making the sexes indistinguishable in some species. However, several species display a striking sexual dimorphism, with the males brilliantly colored and the females a drab, subtle-colored plumage. Tanager species vary in sizes from as small as 9 cm to 26 cm in the larger species (Dunning, 1982). The tanagers displayed at Woodland Park Zoological Gardens have been mostly medium to large species ranging from 12-17 cm in length.

Husbandry and Management

On May 18, 1984, Woodland Park Zoo received a shipment of twelve tanagers from Hendee Zoological Gardens. After a 14 day quarantine, the two pairs of each species of bay-headed tanagers (*Tangara gyrola*), golden tanagers (*Tangara arthus*), and silver-throated tanagers (*Tangara ictercephala*) were set up into pairs and placed into holding cages until appropriate displays were available. A tanager breeding program was established based on data and experience collected from previous breedings of palm tanagers (*Thraupis palmarum*) in May, 1980 and Brazilian tanagers (*Ramphocelus bresilius*) in March, 1981.

A pair of each species was set up in a heavily planted tropical display, with some displays having a pair of small-billed tinamou (*Crypturellus parvirostris*) or crested quail doves (*Geo-*

trygon versicolor) to provide a mixed species exhibit. These cages are glass fronted with wire mesh sides, measuring 12' wide x 11' long x 7-8½' high with sloping ceiling and a potting soil substrate. The silver-throateds as a group of four were put into a larger display measuring 36' wide x 11' long x 7-8½' high. A glass ceiling provides natural lighting with a supplemental 200 watt incandescent light above each display. The entire building is heated by a hydraulic forced air heating system to approximately 70-80 degrees Fahrenheit.

The displays are hosed daily in the morning, and disinfected one to two times weekly with a dilution of Plexidyne spray over the substrate. The birds are fed after cleaning at approximately 9-10 a.m., except during breeding when they are fed by 7-8 a.m. before cleaning. Prior to breeding, an abundance of live food is provided in the cages on a daily basis. The remainder of the year they receive only sporadic, weekly insect feedings. An active fruit fly culture is kept in the display at all times, and a different insect species (crickets, white mealworms, waxmoth larvae, or "pin head" crickets) is fed each day. All diets and insect feedings are heavily dusted with a 50% mixture of Vionate and Osteoform. Once chicks have hatched, a supplemental food pan is provided for the pair to feed the chicks. At approximately one week of age the chicks begin demanding more feedings and an additional two to three extra feedings of insects are placed on the food pans.

Extra feedings continue for two to four weeks after chicks have fledged (14 days) or until self-sufficiency. Some fledglings refuse to be weaned and the process of slowly weaning them over a period of weeks begins with the removal of additional insect feedings and then the supplemental pans until the pair are feeding them the adult diet. A decision is then made to either pull the fledglings or the pair off display. After separation, the fledglings are carefully monitored to assess individual food consumption.

Pairs are allowed to raise two consecutive clutches, then they are pulled off display to halt breeding and allow the pair to rehabilitate. After two

clutches, the pairs begin to look worn-out and dilapidated and are never allowed to produce three consecutive clutches as we have lost several females from "burnout" after or during the laying of their third clutch. If a pair is in good condition and is carefully monitored, they could potentially raise two sets of consecutive clutches with a rest period between sets for a total of four clutches per year. As a general rule, chicks are pulled after weaning from the first clutches off display into holding, leaving the pair to continue on with the second clutch. Once the second clutch has been reared, the pair is pulled off display into holding and the second clutch chicks remain as display specimens until the display is needed for setting up another breeding pair. In addition, tanagers of the same species are not kept in adjacent displays as this causes the pairs to be distracted from their usual patterns of breeding behavior. The males seem to be constantly agitated and spend a great amount of time squabbling through the barrier, or are distracted by the female on the other side.

Tanager Diet: One Bird

- ½-1 C. small chopped fruit
- ¼ t. dry mix w/meat, sprinkled over fruit
- 1 T. soaked Wayne's Dogmeal sprinkled over fruit
- ¼ t. wild bird seed sprinkled over fruit
- 1 T. shredded romaine sprinkled over fruit
- ¼ t. (pinch) fine oystershell sprinkled over fruit diet
- ¼ t. Vionate sprinkled over fruit
- ¼ t. Osteoform sprinkled over fruit

Chopped Fruit Recipe (quarter inch cubes)

- 9 ea. papaya
- 6 lb. banana
- 14 lb. apples

**Peel bananas, remove seeds from papaya, and remove stems from apples. Run bananas, papayas and apples through food processor. Add 8 C. blueberries and 3 C. raisins. Combine and mix all ingredients. Use within 4 days.

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- 1 T. minced, peeled ripe papaya
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Dry Mix w/Meat Recipe

- 20 C. dry mix
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- ⅓ C. oystershell, fine
- 3 T. mineralized salt
- **Mix to an even texture.

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- 50 lb. Purina Trout Chow
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- 25 lb. Ground-up Mynah Pellets
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- 10 lb. bone meal
- **Grind all pellets to powder form, then combine all ingredients and mix.

Breeding and Nesting

The two pairs of silver-throated tanagers were initially set up together during quarantine holding and then were released into the display as a group. While on display these birds split up into two pairs and began breeding activity. This turned out to be disastrous. Although they are a more social tanager, during breeding they become competitive and territorial. This resulted in the first pair hatching out two chicks, but unable to rear them. The nesting male continually chased and displaced the other pair throughout the day in an attempt to keep them from approaching the nest. Whenever the nest was unoccupied during food collection, the other pair would hop into the nest and inspect the chicks. For this reason the nesting female almost continually brooded, and the chicks literally starved, dying at three and five days of age. The pairs were eventually split up and the second pair later successfully raised two chicks to fledging. One chick died at 22 days as it was unable to compete with the stronger chick for food.

The other two pairs of golden tanagers and bay-headed tanagers were surgically sexed by laparoscopy. The

golden tanager pairs were left together, but the bay-headed tanagers were the most difficult to pair up. Three different combinations were attempted before a compatible pair was established. The incompatible pairs displayed a total lack of interest, or frequently displayed open beak threats when approached by the other individual, and fights were even observed. Finally, the most aggressive male and female were paired together and their compatibility was instantly noticed. The remaining pair of bay-headed tanagers was set up and has so far appeared to be compatible.

Prior to breeding, all pairs of tanagers (including non-breedig pairs on display) are removed from exhibits and set up into holding cages in preparation for breeding. These pairs are kept in 3' wide x 3' long x 8' high or 6' wide x 12' long x 8½' high cages with concrete floors. The pairs are left in holding to rest and put on extra weight for a period of one or two months, and then they are transferred back onto display for breeding. The differences in environment from a sterile holding cage to a heavily planted display usually triggers breeding activity by the first week back on display. In addition, the tanagers usually put on a significant amount of weight in holding and are in good general health for breeding. Once back on display, courtship and the laying of the first egg may occur as early as two weeks or as late as eight weeks, with the norm being around six weeks.

Initial courtship begins with an increased frequency of the pair perching within a six inch proximity of each other. Shortly after the male begins courtship, feeding choice foods of insects, blueberries, and papaya to the female. The only male courtship display we have observed has been in the Brazilian tanager. The entire display lasts about five seconds, during which he sings a two-syllable call as he spreads his wings in a full stretch while bowing on a perch facing the female. When the female is ready, she begins to frequently solicit copulation and will follow the male through the display soliciting. No displays or copulations have been observed in the other species.

Soon after soliciting is noted, dried grasses are placed on display for the female to use at the nest building site. By daily observations, one can determine the nest site choice of the female where she has draped several blades of grass or stripped dracaena leaves in a crotch of a tree or plant. All the nest sites have occurred either in dracaena crotches or in a dense bambusa species. It is impor-

tant that a basket be placed at or near the exact spot she has chosen, otherwise she will continue to attempt building a nest at her chosen site. This is done because many of the females are initially not able to complete a nest on their own and appear to be lacking in building skills. Several of the more experienced breeders are later able to proficiently build nests. The square wire hardware cloth baskets (5' x 5' x 2' deep) are first lined with unmilled sphagnum moss and partially cupped out by keepers, then additional moss and grasses are laid on the cage floor for the female to use in finishing her nest by lining it with grasses and leaves and cupping it out. Males show little or no interest, although several bachelor pairs have repeatedly built nests on display. As soon as the nest is completed and cupped out, the female will usually lay within the next day or two. Some females lay on consecutive days and others with a day between layings. In general, clutches consist of two lightly mottled eggs and are laid early in the morning before or just at sunrise. The female incubates 100% with the male staying relatively close and attentive. Some of the males have been observed carrying food back to the nest for the female and feeding her as she incubates. There appears to be no definite breeding season, but there is an increase in intensity and activity in the spring and summer. Winter chicks do not appear to be as vigorous and large as the rest of the hatches, so in general we avoid having chicks hatch from December through February.

Incubation and Rearing

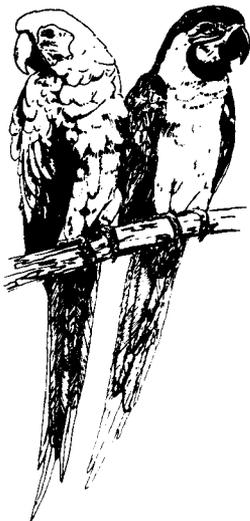
Incubation begins either on the day the second egg is laid or on the day after. The incubation varies from 12 to 14 days. The chicks are usually found hatched or are in the process of hatching by sunrise. They are characteristically typical of tanager nestlings having sparse natal down and the interior of the mouth red. The first chick to hatch is generally the stronger of the two and usually remains so even through fledging and weaning.

As soon as it is light enough in the display after sunrise, the pair begins gathering food and feeding the chicks. Feedings range from every 20 to 40 minutes the first day or two, 15 to 30 minutes until seven days of age, and then 10 to 20 minutes until weaning. From approximately five to ten days the chicks begin developing feathers, and at 14 days at fledging they are almost com-

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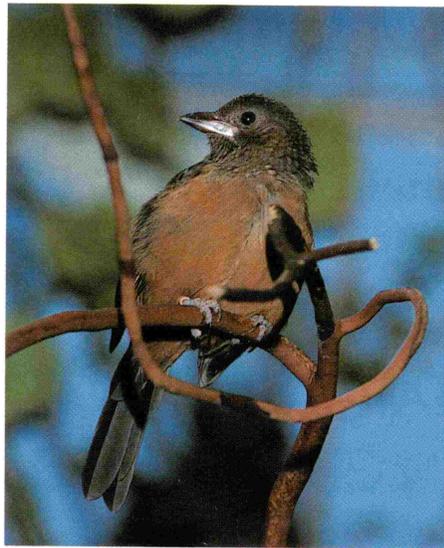
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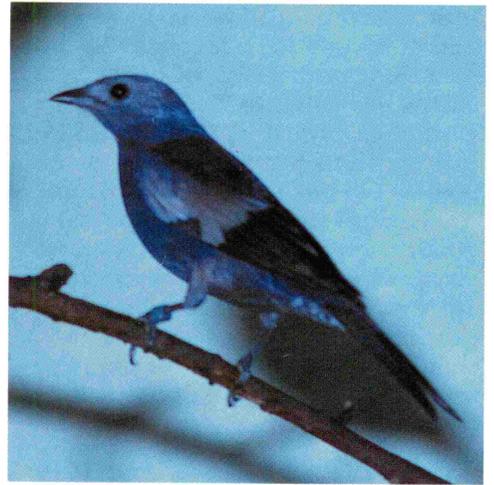
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Brazilian tanager male (*Ramphocelus bresilius*).



Brazilian tanager female.



Palm tanager (*Thraupis palmarum*).



A female bay-beaded tanager (*Tangara gyrola*).



Silver-throated tanager male (*Tangara icterocephala*).

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pletely feathered out but will not be able to fly well for another week. The pair will feed the chicks exclusively on insects (waxmoth larvae, cricket abdomens, white mealworms) for the first seven days, then they begin to slowly add ripe papaya and dogmeal to their feedings. By the tenth day, the pair is feeding the entire contents of the supplemental food pans, as at eight to ten days the chicks begin to call almost incessantly for food and continue to do so for another two to four weeks until they are weaned. At 16 to 17 days of age, the fledglings become flighty and skittish at any disturbances such as a keeper entering the enclosure. During this time extreme care is taken while feeding and no display cleaning is done

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Planted displays. Silver-throated and golden tanagers bred in display on left, bay-beaded tanagers on the right.



Golden tanager (*Tangara arthus*).

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for several days, as we have lost several chicks from fatal injuries when they flew into trees or walls. Fledglings at 21 to 25 days begin to settle down and become proficient at flying, making the commencement of daily routine possible again.

Frequently, the female will re clutch and begin incubating shortly after the chicks have fledged. At the onset of incubation of the second clutch, we start the weaning process by deleting the supplemental food pans from their diet so the fledglings can be pulled the day before the next clutch is due to hatch. These fledglings are then placed in holding cages and watched very closely, as four-week-old fledglings are not quite ready to be on their own. On occasion we have had to hand feed for a day or two until the fledglings have figured out how and where to feed themselves. The chicks are pulled to prevent completely weaning the breeding male out, as he would continue feeding two adult size fledglings and the additional new chicks. This also prevents the fledglings from consuming all the supplemental food, which leaves the pair with nothing to feed the newly hatched chicks.

After the chicks from the second clutch have fledged, the nest basket is immediately removed from the display. The pair will continue to feed the fledglings for another two to six weeks, during which the supplemental pans are slowly deleted from their diet. The weaning process seems to vary widely from clutch to clutch and individual fledglings, depending on their rate of development. Eventually, the chicks are being fed only the basic adult diet. The pair is then pulled into holding to rehabilitate and gain some weight back, because at this point they have become quite thin during the demands of rearing two clutches. The chicks are left on display for a few weeks or months until another pair is placed on display for breeding. Occasionally the breeding pair is pulled early as one to two weeks after the chicks have fledged because the female has begun building another nest in preparation for a third clutch. The pair will stay in holding for several months and then they are placed back on display to repeat the process again.

Problems Encountered During Breeding

This is a list of problems we have experienced during several years of breeding tanagers:

- Pair incompatibility.
- Pair not in good health or weight for

breeding.

- Dietary problems, especially in calcium deficiency in breeding females. Signs appear as shellless or thin shelled eggs, leg splaying, infertility, long egg laying periods (over one to two hours).
- Death of either sex from stress. Causes such as competition from another pair or inability to complete a nest (reason for providing nest basket).
- First time breeders usually lose one or both chicks in their first clutch due to inexperience, if only one egg hatches the pair seem to be able to rear their first chick.
- Death of breeding female after or during laying of third clutch.
- Death of chicks if old, or molding food fed out. One example is dark colored waxmoth larvae that have ingested a moldy food medium.
- Several unexplained deaths occurring with keeper staff changes or interruptions in routine that interfere with continuity.
- Death of second chick if not enough supplemental food provided. The pair feeds first chick until satiated then the second chick.
- Death of one or both chicks if left too long on display with the pair, including holding situations. Generally hard to observe a problem, as birds usually cease activity when being observed by keepers. Dead chicks are usually found with little or no trauma evident or with severe cases of aspergillosis (evident upon necropsy). Usually some aggressive chirping and displacement can be observed and the chicks separated from the pair in time.
- Breeding females at too early an age, especially under one and one-half years. Problems begin appearing as leg splaying, infertility, shellless and thin shelled eggs, calcium deficiency, and general poor condition.

Summary

Basic guidelines and set up for tanager breeding (parent reared chicks):

- Pairs are set up, placed into holding situations, and compatibility noted. Good health and weight desirable prior to breeding.
- Pairs are put into heavily planted displays, and observed for breeding activity.
- Nesting materials placed into the display to note nest site chosen, and a basket placed.
- Courtship, nestbuilding, egg laying, and incubation begins.
- 12-14 day incubation, chicks hatch.
- Five to ten days chick food con-

sumption gradually increases, feather development begins.

- Chicks fledge at 14 days, almost fully feathered but cannot fly well. They will spend next two days hopping from perch to perch. Front of display glass waxed.
- Fledglings at 16-17 days become flighty at disturbances. No cleaning is done for several days and at 21-25 days they begin to settle down.
- Two to six weeks weaning process of fledglings either by pair or keeper intervention. Time varies widely from clutch to clutch and individual fledglings.
- Fledglings pulled off display and monitored for self sufficiency. The pair is usually on a second clutch. If the second clutch has already been reared the pair is pulled and the chicks left on display. A pair is sometimes pulled after the first clutch if they are looking in poor condition, then another species of tanager is put on display to be bred.

This system has worked well with the tanagers at Woodland Park Zoo, and we have gone through many steps in developing the tanager breeding program to its current state. Hopefully this program's success will continue to the point of establishing an F₁ breeding population of tanagers. Much thanks goes to Lee Gartner in helping to develop this project and for all the time, effort, and support he contributed as my co-worker. There are still the "problems" that occur periodically and the new ones that always surface, but with diligence and commitment the success of tanager breeding in captivity should continue to climb.

Woodland Park Zoo first surviving hatchings:

Palm tanagers—July 17, 1980

Brazilian tanagers—March 30, 1981

Golden tanagers—Sept. 19, 1984

Silver-throated tanagers—Oct. 23, 1985

Bay-headed tanagers—June 11, 1986

REFERENCES

- Dunning, John S., 1982, *South American Land Birds*, Harrowood Books.
- Skutch, Alexander F., 1954, *Life Histories of Central American Birds*, Pacific Coast Avifauna, No. 31, Cooper Ornithological Society, pp. 226-240.

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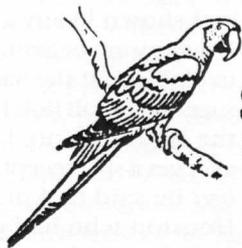
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