Captive Propagation of the Collared Sunbird

(Anthreptes collaris)

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The Collared Sunbirds nested in a covered, hemp-rope nest that the female sunbird lined with aquarium filter floss. Keepers used dry grasses to add a canopy to the artificial nest.

Introduction

The Collared Sunbird *(Anthreptes collaris)* is one of 117 species in the family *Nectariniidae* which is comprised of the Sunbirds and Spiderhunters. The Collared Sunbird is a common and widely distributed species throughout the Ethiopian region of Africa (Clements, 1981).

Both sexes of this active and inquisitive species are metallic green above and bright yellow below. The male is distinguishable from the female by his green throat which is bordered below by a narrow purple band. Individuals measure about nine centimeters in length and weight approximately 7.5 grams to nine grams.

The first captive fledging of the Collared Sunbird in Great Britain occurred in 1987 when a private aviculturist succeeded in rearing one chick (Ridd, 1988). In September 1989, the Dallas Zoo fledged a Collared Sunbird chick that is believed to be the first fledged in the United States. The New York Zoological Park successfully reared two Tacazze Sunbirds *(Nectarinia tacazze)* in 1960 (Conway, 1961). The Denver Zoological Gardens fledged a female Buff-throated Sunbird chick *(Nectarinia adelberti)* in 1989 (pers. comm.).

Photos by Rebecca M. Dellinger

The male Collared Sunbird is distinguishable from the female by his green throat which is bordered below by a purple band.

An intense courtship display in which the male displays yellow breast tufts is performed when the pair is reunited after a separation period of several days.

Housing and Care

In November 1988, the Dallas Zoo received seven wild-caught Collared Sunbirds from Bellbird, Inc. During the quarantine period, the birds were segregated by sex, four females and three males, into two "cubes" similar to the exhibits described later in this article. In January 1989, the birds moved to the Bird and Reptile House. A pair was placed off exhibit. A pair was placed on exhibit and the remaining three birds, two females and one male, were housed together on exhibit.

The exhibits were fiberglas formed "cubes" measuring 145 centimeters high, 110 centimeters wide, and 110 centimeters deep. The front of each cube is window glass.

The exhibits are perched with locally-cut, small trees and vines supplemented with plastic boxwood vines. The plastic vines are misted daily so the birds can leaf bathe, which they do readily. In each exhibit, some of the cut vines, Japanese Honeysuckel *(Lonicera japonica)* and Rattan Vine *(Berchemia scandens),* are gathered into a wreath and suspended in a corner by wire covered with aquarium air tubing. Tubing is used to prevent the birds from injuring a wing on the wire.

Above each sunbird exhibit are two fluorescent light fixtures. Four Sylvania 20-watt, two-foot-long lights are used for each exhibit. Three of the lights are cool white and the fourth is a Gro-Lux. Lights are turned on at 6:45 a.m. and off at 5:00 p.m. during winter months and at 6:00 p.m. during summer months. Skylighting allows the birds some twilight time.

The Collared Sunbirds are fed at 7:30 a.m. and again at 1:30 p.m. Their diet presently consists of Avico Sunbird Nectar, Scenic Bird Food Pellets (apple-flavored), Soft-billed Bird-Fare, fruits and live food. All solid food items are lightly dusted with Super Preen vitamins and oyster shell powder. The policy of dusting the food began July 2, 1989, after a nesting female Orangequit *(Euneornis campestris)* developed symptoms of calcium deficiency.

Live food includes *Drosphila,* small waxworms of one centimeter length or less, fly larvae, and small house spiders. Each bird receives two waxworms and six fly larvae twice a day. The waxworms and fly larvae are dusted with oyster shell powder and Super Preen vitamins and placed in a small, dark-colored bowl. An active culture of *Drosophila* is kept in each sunbird exhibit.

During the breeding season, each pair of sunbirds is given two to four spiders in the morning and two spiders in the afternoon. Spiders collected by the keepers are Cellar Spiders *(Pholcus phalangioides)* of the Pholcidae family and House Spiders *(Achaearanea sp.)* of the Theridiidae family.

Nectar, replaced twice daily, is offered in a small bowl placed on the ground. Each bowl is filled with about 30 milliliters of nectar. Six apple-flavored Scenic Bird Food pellets are floated in the nectar. During the breeding season, the nectar is supplemented with a liquid calcium supplement.

Fruits and finely ground Soft-billed Bird-Fare are offered in a small, shallow dish. This dish is placed in the exhibit in the morning and left until the following morning. The fruit consists of diced grapes, mashed ripe papaya, and mashed banana.

In the afternoon, a small "tree" fashioned from dowel rods is hung in the exhibit. A dowel-rod tree is made by drilling four 5 mm diameter holes into a 200 mm length section of a 15 mm diameter dowel. Sections of 5 mm diameter dowel are then driven through the holes. The drilled holes are placed about 50 mm apart and adjoining holes are placed at right angles to each other. The lengths of the small dowels are such that the birds can easily perch while feeding on the fruit skewered on the dowels. Skewered to the dowel rods are small sections of fruit. These fruits are ripe papaya, grape, apple and orange. The flesh of the fruit must be exposed as the birds do not easily pierce the skin of the fruits. The dowel-rod tree is removed in the morning and scrubbed and disinfected.

Shortly after the chick fledged, it was observed using its bill and tongue to probe vegetation. The newly fledged bird was not able to easily descend to the food bowls because of awkward downward movements. After observing this difficulty, the route keeper constructed a dowel-rod fruit tree as a means of having food accessible to the fledgling.

In addition to the dowel-rod fruit tree, a plastic, hanging nectar feeder was added to the exhibit during the fledgling period. Because of the chick's awkwardness and because adult sunbirds cannot hover long enough to obtain sufficient amounts of nectar from a suspended feeder, the hanging feeder was placed in a location so that the chick and hen could perch while drinking.

Breeding Behavior

Two of the three pairs of Collared Sunbirds nested in 1989, producing a total of ten eggs and four hatchlings. All three pairs displayed courtship behavior and nest-building activity.

Courtship activity was frequently energetic and spontaneous. The introduction of small spiders into the exhibit often elicited vigorous courtship activity and singing from the male. Courtship behavior included rapid darting of the pair about the enclosure. At times, this darting activity developed into a chase of the female by the male. During some chases, the male would grab the female by her tail, sometimes pulling her to the ground. The male, when strongly singing, held his tail cocked and wings drooped (figure 1). Additional male courtship behavior consisted of the male posturing with his body drawn upwards and his bill pointed up, or the male gaping at the female (figure 2). During courtship, the male was also observed probing the feathers on the back of the female. Each pair frequently probed vegetation and nesting material together, but only the female would gather nesting material and take it to the nest. One male was observed hanging at the nest entrance or sitting inside the nest during the days that his mate was actively lining the nest with floss. A rapid tail quivering given by both sexes is also associated with breeding behavior (figure 3).

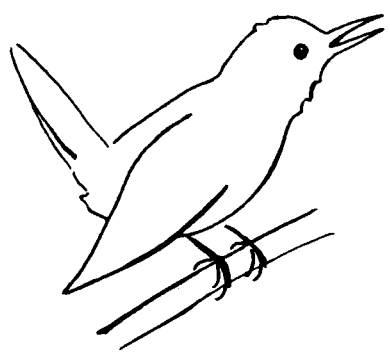
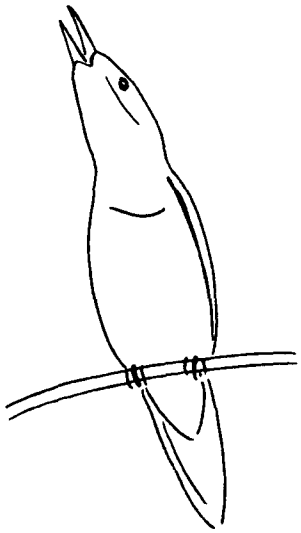


Illustration by Rebecca M. Dellinger

FIGURE 1 — During courtship, the male sunbird frequently sings while holding his tail cocked and his wings drooped.



Illustrations by Rebecca M. Dellinger

FIGURE 2 — One courtship display consists of the male posturing with his body drawn upwards and his bill pointed up.

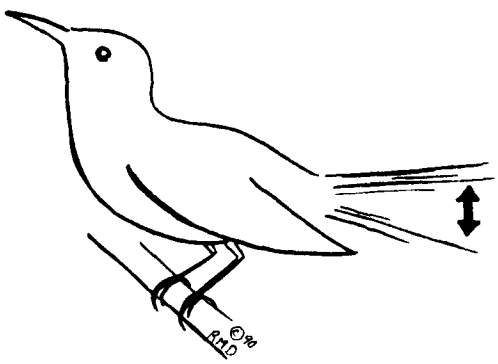


FIGURE 3 — A rapid tail quivering given by both sexes is associated with breeding behavior.

Nest Building

Wild female Collared Sunbirds build purse-like, pendulous nests of cobwebs in which they intertwine leaf matter, rootlets and bits of grass. The completed nest has a tassle-tail and canopy. Males accompany the females in their forays for nesting material, but the males do not participate in actual nest construction (Skead, 1962; Skead, 1967).

The Collared Sunbirds at the Dallas Zoo are offered aquarium filter floss as a substitute for cobwebs. Old cobwebs, bits of dried grasses and sphagnum moss are also offered. The filter floss is a hazard in that a bird can become entangled in the fibers. A safer nesting material is being sought. Two of the adult female sunbirds at the Dallas Zoo have become entangled in floss. One was entangled by a leg band and the second by her nails. One sunbird chick at the Dallas Zoo has died because its tongue became entangled in floss. Incidents of sunbird chicks becoming entangled in nesting material have been reported by the staff of the Denver Zoological Gardens (pers. comm., Scamell, 1964; and Ridd, 1988).

The birds at the Dallas Zoo use the nesting material to line the insides of artificial nests. The nests are a covered, pendulous variety made of hemp rope which are hung from the ceiling grate. During the 1989 breeding season, all four of the female Collared Sunbirds were observed placing filter floss inside a hemp-rope nest. One of the females constructed a pendulous, purse-like nest completely out of filter floss.

Male Aggression

Males show an increase in aggression when their mates begin occupying nests. This aggressive behavior is heightened by human disturbance. One male has been observed to go to the nest and to shake the nest canopy or stab at the inside of the nest with his bill. Male aggression is believed to be the cause of the loss of three chicks and four eggs which were thrown from the nest during the 1989 breeding season. In the wild, male Collared Sunbirds do not incubate the eggs, but do defend the nesting territory and do feed the young (Skead, 1967). Male sunbirds kept in a mixed exhibit may suddenly show aggression and kill other occupants in their exhibit (Barnicoat, 1984).

Live Food Shortages

Loss of sunbird nestlings due to an inadequate supply of live food have been reported by Barnicoat, 1984; Reed, 1969; and Ridd, 1988. The Collared Sunbird reared at the Dallas Zoo required approximately 60 spiders per day during its nestling period and fledgling period. Housing the Collared Sunbird pairs alone and in fairly small enclosures allows them to easily capture spiders placed in their exhibit, helping limit the number of spiders needed.

The staff of the Dallas Zoo collects the spiders in empty baby-food jars. Only one spider is placed in each jar to prevent the spiders from killing each other. When leaving for a foraging trip, a keeper will take a flashlight, forceps, two cloth sacks and baby-food jars with perforated lids. The jars are placed in one bag and transferred to the second bag as they are filled. The jars with spiders are stored on a shelf until needed.

Failed Nesting Attempts in 1989

At the Dallas Zoo, the pair of Collared Sunbirds in the off-exhibit cube were the first to nest. On May 5, 1989, the female began sitting in her nest. On the morning of May 19, a live chick and fragments from two capped and veined eggs were found on the cube floor on the side opposite that of the nest. The chick was immediately returned to the nest, but was thrown from the nest within an hour. The chick was warmed in an incubator at 98°F for 30 minutes and returned to the nest. Six spiders were placed in the cube when the chick was returned for the second time. The keepers continued putting six to eight spiders in the cube hourly throughout the day. After the chick was returned for the second time, the female was observed to be in the nest on all but one occasion during the times when the keepers came to give spiders to the birds. The hen was in the nest when the early-shift night keeper turned the lights off at 6:00 p.m. One chick was found dehydrated and dead at 6:50 a.m. on May 20. Keepers never located the second chick, whose existence was known only from the evidence of the second capped, veined egg.

The female in the off-exhibit cube was seen in her nest the mornings of May 29 and May 30. During the afternoon feeding of May 30, a freshly cracked egg was found on the cube floor and the female was not in the nest.

This female was again in her nest on June 5. At 8:00 a.m. on June 20, a live chick and parts of an egg shell were found on the cage floor. The keepers pushed the interior lining of the nest down so that a deep cup was formed and returned the chick to the nest. An infertile, second egg was removed from the nest. On June 22, the female began building a new nest. The remains of the chick were found June 23 on the cage floor in the corner opposite that of the hemp-rope nest where it had been hatched.

In constructing the new nest, the female did not use an artificial nest. The new nest was made completely from filter floss that the hen attached to a plastic vine. She took most of the floss to build this new nest from the sides and interior of the hemp-rope nest. The female was sitting in the floss nest on June 26. The floss nest broke free from the vine and collapsed to the floor on June 30. The route keeper sewed the nest back onto the vine and later that day the female was seen investigating the nest. On July 1, the female was

removing floss from the floss nest. The keeper was not able to determine where she was taking the floss. Building activity subsided after July 1.

Mortality in Nesting Females

The off-exhibit female was observed to be less active on July 25 and remaining in the lower branches. By July 28, she had reduced coordination and a mild twitching problem. She was observed eating at the food bowls, but was clumsy in her descent and landing. Collected fecal samples tested negative. The veterinary staff found no obvious signs of head trauma.

By August 4, the mild twitching had progressed to jerking movements. The male sunbird was removed from the exhibit and paired with the fourth female Collared Sunbird on August 4.

The female's condition continued to deterioriate. On August 12, the bird was having difficulty staying erect and tended to flip backwards. By August 18, the bird was having trouble controlling her feet and had begun using her wings to help her when she was on the floor of the exhibit. She was almost exclusively eating small waxworms that the keepers placed on the floor of the exhibit. She consumed about one waxworm each hour. Medication was administered to the bird by injecting the medication into a waxworm immediately before it was consumed by the bird. Medications administered by injection into the waxworms were Neo-Calglucon (glubionate calcium syrup), Caldex, and Chloramphenicol BID. Medications given to the bird by direct injection into the bird were vitamin B, vitamin E, selenium, Banamine (Flunixin meglumine) and a steroid.

The bird was placed in a brooder on September 2 as she was having difficulty eating. The shaking was noticeably worse. While the bird was in the brooder, a keeper would offer nectar hourly. The bird frequently drank the offered nectar.

On September 3, the bird weighed 6.2 grams. She had weighed 7.8 grams when she arrived at the Bird House. On September 3, the bird began to experience seizures in which she thrashed about the floor of the brooder. She would recover and resume perching.

The duration and frequency of the seizures continued to worsen. The bird died September 6. The illness had lasted 41 days. The necropsy was inconclusive. The primary examination showed no abnormalities in the brain nor visceral organs. The histopathological report stated encephalitis, likely viral in origin. It is possible that the encephalitis was a secondary development. In case an inadequate level of serum calcium was the primary trouble, the Collared Sunbird that nested in September 1989 had a liquid calcium supplement added to her nectar.

Illnesses in which nesting female sunbirds experience fits and seizures are described by Reed (1969) and VanDegrift (1989).

Successful Rearing of Chick

The hatching and fledging of a Collared Sunbird chick at the Dallas Zoo succeeded when the male parent was removed from the exhibit at the time the female showed egg-laying behavior. The male parent was not returned to the exhibit until the chick was 53 days old. The chick was removed when the male parent was returned.

The pair which produced the fledgling was on public display in an exhibit designated Cube 12. The dimensions and set-up of this exhibit are described in the section titled Housing and Care.

On May 13, a broken egg was found on the floor of Cube 12. At this time, the exhibit contained one male and two female Collared Sunbirds. The smaller of the two females was

AVI-TIPS

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Quarantine

Newly acquired birds should be quarantined for 30 to 60 days before they are placed in your collection or bird room. Consider the following when quarantining a newly acquired bird:

1. Your quarantine area should be separate from where your other birds are housed.
2. Feed and clean cages of your other birds first, then of your quarantine area. Never travel from quarantine area to your main collection without changing clothes (consider purchasing several full-length lab coats) and disinfecting footwear (dipping rubber boots in disinfecting solution).
3. During quarantine, birds should be examined and weighed periodically.
4. Clean dishes and water bottles with 1/4 cup bleach to half gallon warm tap water (plus a few drops of dish soap).
5. When changing cage paper, roll the paper up while removing from the cage, avoid creating dust from dried feces.
6. Spray floor with plant mister when sweeping to prevent fecal dust from becoming airborne.
7. Don't automatically administer medications. Have your birds tested (fecal and blood) and administer the appropriate medication with consultation of your avian veterinarian.

Prepared by Laurella Desborough, Professional Standards Committee. For more detailed information, refer to L.M. Withey's article in the 1990 Proceedings of the Avian Pediatric Seminar.

believed to be the bird that had laid the egg as she appeared fluffed and listless on May 13. Both females had been nest building in the days preceding the discovery of the broken egg and the male had been courting both females. The larger, more dominant female was moved to an off-exhibit cube on May 17. The female remaining with the male continued her nest building. She sat in the nest most of the day on August 4. This nesting attempt ended on August 6 when two eggs were thrown from the nest. The keepers papered over the front of the exhibit at this time and the temporary rope barrier that was already in place was modified to ensure greater privacy for the pair. The keepers monitored the birds through a peek hole.

The female in Cube 12 was seen carrying filter floss to her nest on August 7. Nest building and courtship activity continued throughout the next three weeks. During the morning of August 27, the male was seen hanging at the nest entrance when the female, carrying floss in her bill, flew to the nest entrance and pushed past the male to enter the nest. Later in the morning, the female was observed tail quivering. During the early afternoon, the female was observed sitting in the nest. On August 31, the female was observed while she perched in a tree to be fluffed and breathing harder than normal.

The female was again in the nest on the morning of September 1. On this date, the male was observed to repeatedly fly to the top of the nest and to grab the canopy of the nest with his bill and shake the nest. The male was then seen entering the nest while the female was believed to be in the nest. The male was removed from the exhibit. On September 2, the female began sitting for an incubation periof of 14 days. She seldom left the nest. Shell fragments of a capped and veined egg and a perforated second egg were seen on the exhibit floor the morning of September 15.

Throughout the day on September 15, the female was observed catching fruit flies and spiders. The female removed the legs from each spider before taking it to the chick. The keepers placed 59 spiders into the exhibit on September 15. The hen was also seen taking a tiny, newly molted, white cockroach to the nest on September 15. Spiders were dropped into the exhibit onto the vine-wreath by the keepers hourly from 6:30 a.m. until 5:45 p.m. through the plastic ceiling grate. Beginning September 5, Day 3 of the chick's life, keepers began dusting about 20 percent of the spiders with Super Preen bird vitamins and oyster shell powder. The hen learned to anticipate the introduction of spiders to the exhibit and frequently caught one or two of the spiders immediately. Some of the spiders were later seen hanging in corners of the exhibit. The hen seemed to overlook these spiders until one of them moved.

The female brooded the chick for the first few days. She was first observed offering the chick a tiny waxworm on September 20. Because the chitinous exoskeletons of waxworms are difficult to digest and may cause impaction and since the spiders were readily available, the keeprs decided to limit the number of waxworms offered to only one or two per hour.

The chick was first seen on September 21. By this date, the hen was no longer removing all the legs from the spiders. On September 25, which was Day 11, the chick seemed to have an increased appetite as the hen was observed to make more frequent visits to the nest with food for the chick.

The chick fledged at first light on September 28 which was Day 14 of its life. The newly fledged bird appeared cold so a heat lamp was added above the exhibit with care being taken that the lamp would not cause the chick to overheat or dehydrate. A Sylvania Heat Infrared Resistant, 250-watt bulb was used. Shortly after the heatlamp was installed, the hen was observed sunbathing. The chick perched high in the exhibit and when it fell to the ground, had to spend several minutes fluttering and scrambling to reach the higher branches. Much of the excess nesting material had been removed from the exhibit in anticipation of the fledgling. In addition, the water bowl and nectar bowl contained rock islands so the chick could not soak itself if it fell into the bowls. The chick spent most of the time sleeping during the first few days of the fledging period. After the fledging, the chick and hen did not return to the nest.

The chick soon learned to feed from the suspended nectar feeder and to poke at the fruits which were skewered to the dowel-rod tree. Within a few days of fledging, the chick mastered horizontal and upward movements, but took several more days to learn how to descend in a controlled manner. On October 3, the chick was observed going to the hen to receive a waxworm. Previously, the chick had waited for the mother to present the food item. The chick was seen catching a spider for the first time on October 13. The hen showed some mild aggression towards the chick on October 20 and was last seen giving the chick food on October 30. The chick was removed from the exhibit on November 5 and the male parent was returned to the exhibit.

On December 1, at 79 days of age, the chick began its first molt. During January 1990, the remaining horn color at the base of the chick's bill darkened. Throughout February and March 1990, the chick continued its molt. On February 23, the bird had a tail-less appearance. At the time of this writing, May 1990, the chick appears to be in excellent condition and has the characteristic bright yellow underparts and metallic green of its species. The plumage and behavior of the chick indicate that it is a female.

Reintroduction of Male to Exhibit

On his return to Cube 12, the male immediately courted the female in an intense display. His wings were held out. His tail flipped up and down and tufts of yellow breast feathers extended from the sides of his upper breast. The male's song was loud and energetic. The female responded with mild wing flipping and some tail quivering. The male was later seen shaking the nest. Fortunately, the courtship activity subsided. With the cooler weather, the spider population would have been too small to supply enough food for another chick.

1990 Season

The 1990 breeding season began with two hens on eggs in February. Regrettably, both clutches met with failure. A pair unrelated to the 1989 chick lost their chick on Day 3 as a consequence of the hen becoming entangled in nesting material. The parents of the 1989 chick laid in February 1990. Their first clutch failed with one infertile egg and one late dead embryo. A second attempt in March resulted in a late dead embryo and a weak chick that died at three days of age. The staff determined that these losses were caused by the close proximity of a heating duct to the nest thus reducing the humidity in

the exhibit. The low humidity trouble was corrected and on April 29, 1990 the pair hatched a healthy chick. Unfortunately, this chick became entangled in floss by its tongue and died on Day 4.

Summary

Successful captive rearing of members of the Nectariniidae family are infrequent. In September 1989, one of the three pairs of Collared Sunbirds at the Dallas Zoo fledged a chick. This fledging is assumed to be a first for the species in the United States.

The birds nested in a pendulous, hemp-rope nest that the female lined with aquarium filter floss. The use of filter floss is hazardous as it can entangle a bird. Because of male aggression towards the eggs and nestlings, the male was removed from the exhibit as soon as the female laid. The incubation period was 14 days. The nestling period was also 14 days. The nestling was fed almost exclusively fruit flies and small house spiders. Maintaining an adequate supply of spiders for the hen was a difficult challenge for the keepers.

One female Collared Sunbird of a pair that repeatedly nested unsuccessfully, due to male aggression towards the eggs and chicks, developed twitching and seizures. Her necropsy was inconclusive. A review of the literature concerning sunbirds reveals that there is a problem with nesting female sunbirds developing seizures. The authors presently recommend that female sunbirds not be allowed to repeatedly cycle through egg-laying in one season and that an adequate calcium:phosphorus ratio be maintained in the diet.

Both the Dallas Zoo and the Denver Zoological Gardens plan to continue their sunbird breeding programs and would like any information concerning diet, health care, husbandry and numbers of species and individuals currently in United States and Canadian collections (pers. comm.). It is hoped that with collective cooperation, the Nectariniidae can be more successfully maintained and bred in captivity by dedicated aviculturists.

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Suppliers

("Wigglers", fly larvae)
Arizona Biological Control, Inc.
18701 N. Lago Del Oro Parkway
Tucson, AZ 85704

(Avico Sunbird Nectar)
Avico
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Norco, CA 91760
1-714-371-8330

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(Scenic Bird Food Pellets)
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(Soft Billed Bird-Fare)
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Denver, CO 80231

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1000 East Williams Street, Suite 100
Carson City, NV 89701

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