

# The Gouldian Finch:

## aviculture and reproduction

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Although I am not a large-scale breeder and exhibitor of finches, I have accepted the invitation of the editor to write this article on the management and breeding of the Gouldian Finch with great pleasure. This is because the information on breeding, foster parenting, artificial incubation and, particularly, hand-rearing from egg of this species is also relevant for many other species of finches, including the most demanding of the waxbills.

This article focuses on the biology, management and breeding of the Lady Gould Finch (*Chloebia gouldiae*). The special problems presented to the aviculturist by the frequent failure of Gouldian parents to incubate and/or raise their offspring is, as we will see later, not completely negative, but may, under certain circum-

stances, carry positive consequences for the husbandry of this species.

### Biology of the Gouldian Finch

Many books and innumerable articles cover the biology of the heterogeneous bird compound called finches. Here I will restrict myself to the description of the specific aspects of the Gouldian Finch's biology that will help the aviculturist to draw conclusions that can be extended safely to the management of other species kept in captivity.

### What is a Gouldian finch?

For the aviculturist, finches are birds that eat totally or in part a seed diet. They can be subdivided into "European finches" and "exotic finches". Examples of the first group

are the Canary and the Goldfinch; and of the second, the waxbills and the grassfinches. The ways these groups of finches hull their seeds differ. The *Fringillidae* use a central crest in the lower side of their upper jaw, rubbing it against the edges of the lower jaw; whereas the *Estrildidae*, for example, use the two edges of the bill<sup>1</sup>. The principal difference between the two groups, however, is in the nest shape — open for the Europeans and covered for the exotics. This difference in shape corresponds to differences in the begging behavior of the chicks, and in the feeding technique of the adults. The chicks of the family *Fringillidae* (like the European Goldfinch) and of the *Serinae* (such as the Canary) beg by stretching their neck high up, and the parents feed perching on the



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edge of the open nest. On the contrary, the chicks from the *Estrildidae*, for example, beg by turning their head sideways, as does the Gouldian finch. Excellent articles that cover behavior and reproduction of finches from the avicultural point of view have been published<sup>2,3</sup>. The Gouldian Finch, like most parrot finches, grassfinches and waxbills is a cavity nester that builds unrefined nests, or chooses natural cavities in trees, sometimes not even carrying material inside them<sup>1</sup>.

The Lady Gould's Finch is one of the most beautiful birds kept in captivity, and one of the simplest to care for. I will not describe in detail its looks since nearly everybody has seen photographs of this species in its three naturally occurring color variants. However, extensive descriptions of this bird can be found in Evans and Fidler's excellent book<sup>1</sup>, in Bates and Busenbark's<sup>4</sup>, in Woolham's Handbook of Aviculture<sup>5</sup>, and in the Encyclopedia of Birds by Perrins and Middleton<sup>6</sup>. Articles covering the aviculture of the Gouldian Finch have appeared in many avicultural magazines<sup>7</sup>. The most striking feature of the Gouldian Finch is the presence of sharply divided areas of intensely contrasting colors of the plumage. People interested in developing color mutations in captive birds will find in this species ample material to work with. I will not cover in detail the ever increasing color mutations of the Gouldian. This is a subject for specialists.

### Color

The color of the Gouldian Finch is the subject of continuing biochemical research in the field of natural pigments, particularly those belonging to the carotenoid group. Feather colors can be grouped in two categories: structural colors, and pigments. Structural colors are generated by the physical structure of the cells that constitute the feathers, which reflect and scatter the light so that black, white, blue or iridescent colors are generated. These colors are destroyed if feathers are mechanically damaged. The Gouldian has these type of feather colors in the back, neck, tail and breast. However, the yellow, orange and red tones are produced by pigments of the group called carotenoids<sup>8</sup>. These substances are close relatives of the vitamin A and of  $\beta$ -carotene, present in highest amounts in egg yolk, shrimp

and carrots. The carotenoid pigments are soluble in fat and not in water, and sometimes are called lipochromes. The other group of pigments that are not structural colors are the melanines. Melanine is a compound formed by biochemical transformation of the amino acid tyrosine. The melanines produce black, browns or reds. Melanines, as opposed to the carotenoids (which are never deposited in discrete areas of the feathers, but either cover all the colored area or are totally

head is produced by melanin, which covers the red. The orange in the head has been tentatively classified as lutein epioxide, which takes the place of canthaxanthin and becomes visible in the absence of melanin<sup>8</sup>. This information has important implications for the feeding of this bird, and the consequences on the color that a diet imbalanced in vitamin A,  $\beta$ -carotene and tyrosine can produce should be kept in mind. I will end this digression on color by reporting that black and red heads follow sex-linked patterns of inheritance. A mixed pair will produce offspring of both colors<sup>9</sup>. However, the orange is recessive, and mixed pairs with one orange-headed member will produce progeny following complicated rules<sup>9</sup>. In the wild there is one red bird about every six black headed, and one orange every six thousand<sup>9</sup>.

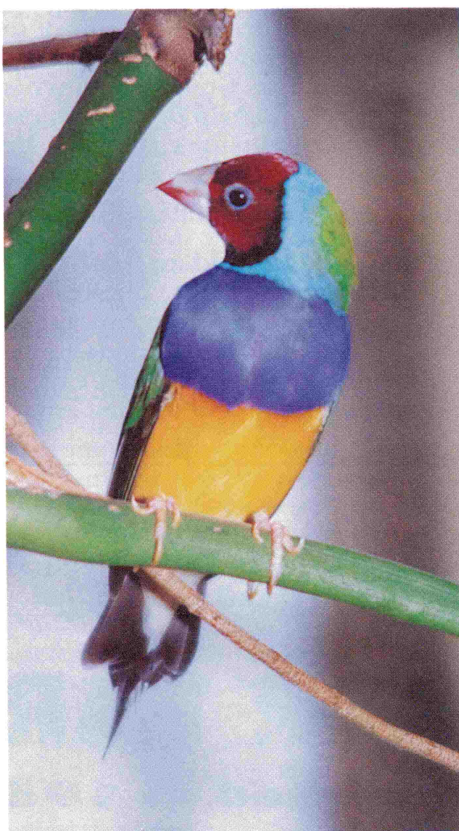
### The Gouldian in the Wild

In order to understand the basic requirements of a species, it is indispensable to know its habits in the wild and its relationship to other known species. This is the basis on which aviculturists develop protocols of husbandry, which will guarantee reproducible success. I will cover in this section the taxonomical placement (classification) of the Gouldian, and its habits in the wild.

The Gouldian Finch is superficially similar to the genus *Amandina* (Cutthroat finch), and closely related to the *Poephilia* (grassfinches), *Erythrura* (parrot finches) and *Lochura* (mannikins) genuses. However, many authorities place it in a separate genus, *Chloebia*, intermediate between the parrot finches and the mannikins. A clear avicultural coverage of the mannikins has been published elsewhere<sup>10</sup>. Despite the extensive analysis of Immelmann<sup>11</sup> and Goodwin<sup>12</sup>, I personally prefer this finch to be placed with the parrot finches of the genus *Erythrura* because of the striking similarity of the internal markings of the beak in the immature, and the similarity of texture and color of the feathers, although their temperament and behavior is rather different. Only DNA fingerprint analysis and protein sequence comparison between these genuses will allow us to reach a final conclusion as to the correct taxonomical placement of this bird.

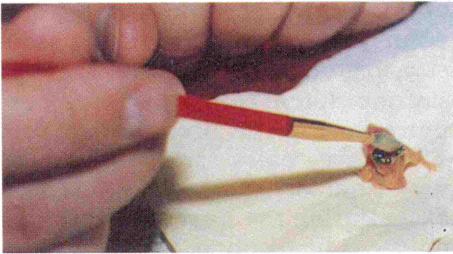
The Gouldian Finch originates from northeastern Australia<sup>13</sup>. The climate

Photo by Donald Bourque



Normal red-headed male Gouldian Finch (from the author's collection).

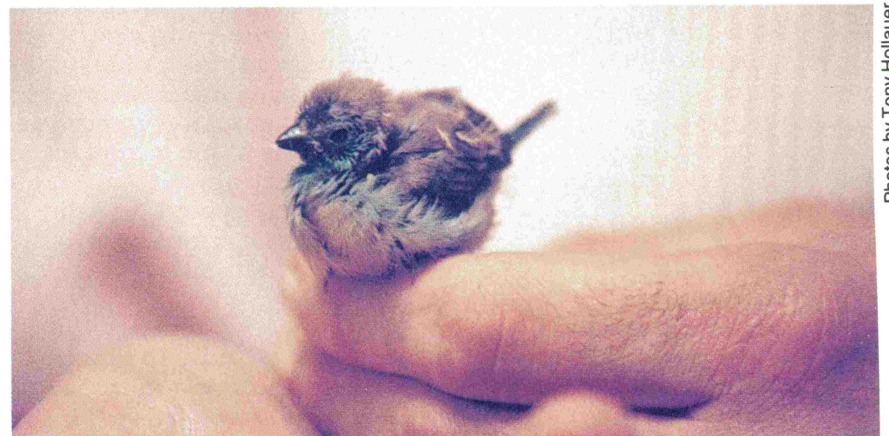
absent), can be deposited in a discontinuous pattern in the feathers, thus producing variegations, spots or designs within a single feather. Because all the chemical reactions in the body that produce these colors are under complex genetic control, a mutation occurring in one or more of the genes controlling the enzymes that form the different colors can produce color mutations. In the Gouldian, the yellow in the belly is produced by lutein (3,3'-dihydroxy- $\beta$ -carotene) and the red in the face by canthaxanthin (4,4'-diketo- $\beta$ -carotene)<sup>8</sup>. Lutein, mixed with melanines and structural blue, is present also in the green of the back and the lilac of the breast. The black of the



Feeding technique used to hand-raise a Gouldian Finch from day 1. A thin paintbrush is used through day 4 in order not to damage the delicate tissues of the mouth (panel A). With the dilation of the crop, the chick can be fed less frequently, using an eyedropper (panel B) and then a plastic syringe (panel C). When the formula is semi-solid, a small, wooden spatula is used (panel D). All instruments are disinfected in a 10% solution of common bleach in water, before and after each feeding.



Development of the Gouldian Finch. Note the absence of down in this species, the appearance of dark pigment in the beak and skin during the first week, the appearance of feather tracts after day 8 after hatching. The markings inside the mouth and the fluorescent spots at the angles of the bill are distinctive of the species. The chick will retain this coloring until the first molt, after eight or nine months.



Hand-raised red-cheeked Cordon Bleu at day 19 (top) and at three weeks (bottom). This chick was raised using the hand-feeding formula described in Table 3, starting from day 4 after birth. (From Tony Hollauer's collection.)

**TABLE 1**  
**Predicted Head Color in the Offspring of Mixed Gouldian Pair**  
**with Red or Black Head**

MALES	FEMALES	
	Red-headed (RO)	Black-headed (rO)
Black (rr)	50% red male, split (Rr) 50% black female (rO)	50% black male (rr) 50% black female (rO)
Red (RR)	50% red male (RR) 50% red female (RO)	50% red male, split (Rr) 50% red female (RO)
Red, split (Rr)	25% red male (RR) 25% red male, split (Rr) 25% black female (rO) 25% red female (RO)	25% black male (rr) 25% red male, split (Rr) 25% black female (rO) 25% red female (RO)

*Opposite to mammals, in birds, males have XX sexual chromosomes and females have XY. The head red factor (R) is carried by the X chromosome and is dominant over the black factor (r).*

there is sub-tropical, with a monsoonic cycle. The temperature is constant, around 70°F, with variations of about 10°F between night and day. The humidity varies enormously, however, between the wet and the dry seasons, the wet season corresponding to our winter and the dry to our summer. I have recently visited the northern regions of Australia in July, and the climate in the coast was that of a well climatized apartment in Manhattan. However, it is much drier inland, particularly in the western part of the Peninsula of York. This type of climate determines the life cycle of the Gouldian. The bird migrates to the southern areas of its range at the beginning of the wet season in order to breed. During the dry season, the Gouldian, like the Zebra (*Taenopygia guttata*), the Long-tail (*Poephilia acuticauda*), the Star (*Neochmia ruficauda*) and the parrot finches (genus *Erythrura*), travels in small to medium size groups in a nomadic fashion depending on the availability of food and water<sup>13</sup>. When the wet season approaches in September-October, the birds find natural cavities to nest in. Some of the birds, however, build a shapeless, globular-type nest in bushes and trees<sup>1</sup>. Breeding soon follows. The plentiful flowering and seeding grasses provide, along with the abundant insect life, the high protein food necessary for the rearing of the young.

In the wild, the Gouldian Finch has decreased in number enormously. This can hardly be attributed to

trapping for the pet trade, since this phenomenon has decreased to insignificant proportion after Australia introduced a ban in the early '60s on all foreign bird import and all native wildlife export. Currently, the status of the Gouldian is not that of an endangered species but, in the opinion of many Australian aviculturists I have talked to, it is somewhat threatened. One of the factors seems to be the infection with air sac mites, which causes great mortality in these birds. I will return later to the problem of air sac mites.

#### Aviculture of the Gouldian Finch

In this section I will cover housing, diet and breeding of the Gouldian Finch. In a separate section I will cover the techniques for hand-feeding rejected nestlings.

#### Housing and Breeding Setup

Gouldian finches fare well both as aviary and cage birds. Australian aviculturists generally keep Gouldians outdoors, in partially covered, planted aviaries, with an enclosure that can be locked to prevent the exit of the birds in case of bad weather. Often, Gouldians are kept in mixed collections with Shaft-tails, Zebras and other species. In the U.S. these birds are generally kept in cages, in groups or in pairs. Breeding cages vary in dimension from canary breeding cages to six foot long and four foot high small flights. I keep my Gouldians permanently in pairs, in cages three feet long, two feet deep

and high. The juveniles not yet in color are kept in cages of the same size, in groups of four to six, that is to say one clutch. Gouldians form loose pairs during the breeding season. Therefore, pairs can be separated when not breeding, and paired up again during the next season. In the northern hemisphere they should be set up with nesting facilities at the end of August. This should be delayed if the molt is not yet complete. Gouldians molt once a year at the end of the breeding season, in March-April. This is a period of stress for the birds, and they need to be taken care of more carefully than usual, making sure that appropriate food is available at all times. The fact that molt happens after the often heavy breeding season poses additional stress to the birds, causing them to develop or show signs of hidden disease, or the deleterious effects of long-term inappropriate husbandry. Juveniles from the previous season that have not yet molted into adult plumage should not be set up for breeding.

My bird room lights (Vita-Light or Chroma 50) alternate from 18 hours of light in summer to 13 hours of light in winter, under the control of two timers. There is one half hour dimming morning and evening, to allow the birds, especially the hummingbirds that share the room with my finches, to find a roosting place for the night. I set up my pairs in September, in cages of the dimensions given above. For nest I prefer to use 5" x 5" x 5" wooden boxes, with a front hole of 1.5", half filled with undone, natural rope, cut in 2-3" pieces. I fill the boxes myself and press a nest-shaped cavity in the middle with my fists. My pairs have proven to be bad nest builders and even worse parents, but they invariably lay clutch after clutch of fertile eggs. Being cavity nesters, the Gouldians do not need to go through the ritual of nest-building in order to breed. However, because the courtship ritual of the male includes a dance with a feather or a twig in its beak, I always give my birds some loose nesting material that the male carries into the nest. I have also used nests with the front half open, but it seems that the hen is less disturbed with the model with the hole. One important consideration to keep in mind in the choice of nesting facilities for this species is that Gouldians copulate inside the nest. Therefore,

the nest must be large enough to accommodate comfortably both members of the pair.

### Diet

The diet of the Gouldian Finch is straightforward. The most important element of a good diet for Gouldian Finches is that it contain at least one source of high quality protein throughout the year. The birds will consume the high protein food according to their needs. My finches are kept on a diet of commercial finch seed mix, egg food, cuttlefish bone and spray millet. Their consumption of egg food peaks during the prebreeding and egg-laying period. They also consume much egg food during their molt. I have offered my Gouldians and Gold-Breasted Waxbills, that are kept on the same diet, many types of live food such as small mealworms, maggots and silkworms, but they have steadily refused to touch them. They have also refused all green food and consume only a minuscule amount of fruit, so that I have given up these items completely. Nevertheless, my birds have bred every year, and have produced all fertile eggs.

Since my birds have proven to be extremely bad parents, stopping incubation prematurely on repeated occasions and, in the few occasions they have hatched eggs, throwing the chicks out of the nest, I have resorted systematically to foster parenting. For this purpose I have used both Society and Zebra Finches. Both have done an excellent job with Gouldians and Gold-breasted Waxbills (*Amandava subflava*), but I think that the Zebras are superior. The Societies have mercilessly thrown out of their nest all Gold-breasted Waxbill babies every time one of their own eggs that had escaped my control has hatched. Perhaps the chicks of the Society look so different from the little black Waxbill chicks that have no down at all, that the birds can differentiate between their offspring and the adopted chicks. Advice about using Societies as foster parents has appeared in *BirdTalk*<sup>15</sup>. Whatever species you use as foster parents, the most important consideration in their management is that they must be used to consuming egg food. The Gouldian and Waxbill chicks need a diet much richer in protein than the Zebras and Societies. If the parents limit themselves to stuffing the crops of the

chicks with seeds, as sometimes they do, birds of inferior quality will be produced. Their colors will be faded or not vibrant, and sometimes the chicks may have deformities, or die before fledging, or during their first molt. In the absence of a high protein food, the Zebras generally will destroy the chicks.

### Bad Parenting

Why many species of finches are such bad parents is a complex problem every aviculturist has attempted to understand at some point<sup>16</sup>. Birds such as waxbills, which become nearly completely insectivorous during breeding, and do not feed their babies by regurgitation but carry insects to them in their beak, will probably not raise babies in captivity because the appropriate food is not available. This seems to be the case with most African waxbills, especially the less known, rarer species such as the Violet-Ear and the Purple Grenadier of the genus *Uraeginthus*. However, two other elements may be involved in causing trouble with breeding. One is the level of disturbance of the birds, and the other is genetics. Wild-caught birds are sure candidates to be bad parents in captivity. They can be very fussy about nesting material, rearing food, humidity level and the presence of other birds in sight or earshot. In the case of the Gouldian, however, this does not seem to be the case. This finch has not been exported since the early sixties because of the Australian ban on exporting and importing wildlife. Therefore, our birds are semi-domesticated. The Gouldian Finches that we handle have been bred for at least 20 to 30 generations in captivity. Nevertheless, these birds still breed in winter, according to the southern hemisphere calendar. This suggests that the Gouldian has a rigid timing mechanism in the brain, regulated genetically. Most of the times Gouldians are poor parents because their breeding cycle is either too short (they incubate for seven to nine days, then start again laying eggs), or the male does not click into the rearing mood, and as soon as the eggs hatch he starts again the courtship ritual, something like a music box that is stuck. If we consider this together with the fact that these birds have been bred in captivity for such a long time, thus possibly reinforcing some of these genetic traits, the most likely conclusion is that the

bad parenting behavior in the Gouldian Finch is probably caused by genetic factors. The waxbills have not yet been established enough to have genetic alterations enhanced by controlled breeding. I have, in fact, had proof of this by experimenting with my Gold-breasted Waxbills. I bred my pair of Gold-breasted Waxbills, hatching and raising the chicks under Societies. I gave one of my hens from this clutch to a friend aviculturist, who bred from her the following year. Surprisingly, she incubated and raised all her chicks. This was in a mixed indoor aviary with many other species of finches, including very aggressive species such as parrot finches and Cordon Bleus (genus *Uraeginthus*). My conclusion is that some of the more established species that do not raise their offspring have been somewhat genetically selected for their altered breeding cycle. I must comment, however, that despite the horror that foster parenting birds may elicit from the purists of aviculture, I believe that raising Gouldians under a different species can have positive consequences. Air sac mites are parasites very common in Gouldians. These little arthropods are species-specific, that is that they are extremely picky about the species that they parasitize. Possibly, the most common cause of death in Gouldians under stress is an acute attack of air sac mites. Because these mites can only be transmitted from other infected Gouldians, and not from different species, foster parenting represents the most effective measure of prevention available. Although Ivermectin is effective in the treatment of this disease, prevention is always the best cure. By raising Gouldians under foster parents, we effectively prevent air sac mite infection transmitted from the parents.

### Foster Parenting and Other Techniques

Foster parenting of finches under a different species has been used and abused in aviculture. Aviculturists have learned the technique from the natural phenomenon of parasitism. The cuckoos and the whydahs are two well known examples of natural foster parenting under a different species. The cuckoos lay their eggs in the nest of a variety of other species, and the whydahs do so in the nest of the Violet-Ear (*Uraeginthus grana-*

*(continued on page 48)*

# The Gouldian Finch

(continued from page 35)

*tina*) and the Melba Finch (*Pytilia melba*), and the Purple Grenadier (*Uraeginthus lathinogaster*). In dealing with our foster parenting we have much to learn from these species. First, the eggs of the cuckoos are marked with patterns similar to the parasitized species; second, the eggs of the parasitic bird hatch earlier than those of the parasitized species, so that the foster parents will accept the different nestling as their own more easily; third, the foster parents are selected for tolerance by careful "culling" by the parasitic species. Thus cuckoos will kill the foster parents that remove the foreign egg from their nest, and practically select for a more tolerant population.

Aviculturists have used foster parenting for two purposes: to raise "difficult" birds, in which the breeding cycle does not flow smoothly in captivity because of the lack of some environmental stimulus, and second to increase the yield of birds that will recycle when their clutch is destroyed or removed. Personally, I do not approve this second use of foster parenting, because it results inevitably in overbreeding and selecting for "bad" parents. Many Waxbills, the Gouldian Finch and the Black-hooded Red Siskin are frequently hatched and raised under foster parents. Of course, the Red Siskin is fostered under canaries, but both Society and Zebra Finches may be used to foster waxbills and Gouldians.

The most commonly used foster parents for Gouldians is undoubtedly the Society (Bengalese) Finch. This species originated from many cross-breedings among Mannikins carried out centuries ago in the far east. (Consequently, we do not know with any certainty the ancestry of this species. The Society Finch is monomorphic and, when adult, it will go to nest in a matter of days if not too disturbed. The requirements of these birds are simple, and their price on the market low. This makes Society Finches the logical choice for foster parents for Gouldians. The only important factor in a successful fostering operation of this kind is the familiarity of the Bengalese with egg food. It is imperative that foster parents for Gouldians eat at least one type of high protein food. Zebra Finches have always made excellent foster parents for both Gouldians and

Gold-breasted Waxbills in my hands. However, one must be sure that the zebras are cycling properly, without sandwiching eggs and killing nestlings. It is always better to use a pair of foster parents that have not hatched their own chicks. This is especially important when chicks of the fostered species differ markedly from those of the fostering species. I used Societies to foster Gold-breasted Waxbills and they worked out fine. However, on one occasion they hatched one of their own eggs that I neglected to remove. Because I did not have the heart to destroy the chick, I left it in the nest. The Societies ejected the Gold-breasted nestlings one a day until all were killed. In order to prevent this it is important to mark the foster's eggs with a pencil as soon as they are laid and remove all of them when the fostered eggs are substituted for them. The foster parents should be coordinated to cycle as synchronized as possible with the species to be raised. There is generally no harm in lengthening the incubation period by placing unincubated Gouldian eggs, for example, under a pair of Zebras or Societies that have been sitting tight for a few days. Of course, the fosters must be completely familiar with nest inspection and handling of their eggs, in order to tolerate the manipulations necessary for the substitution of their eggs. A conservative estimate for a normal breeding season is that one needs four pairs of foster parents per pair of Gouldians or waxbills. This way one can successfully raise 20 to 30 chicks in a season. Usually the clutch size of the Gouldian and Gold-breasted Waxbills is five but, occasionally, one gets larger or smaller clutches. Frequently the first egg laid is infertile. I generally make sure that the foster parents are sitting tight before substituting their eggs, and wait until the Gouldians or Waxbills have completed their clutch before transferring their eggs under foster parents.

## Special Techniques: Incubator Hatching and Hand-raising

Although some aviculturists are blessed with pairs of Gouldians that raise their chicks, this has not been the case for me. I started keeping Gouldian finches three years ago, when I acquired a mixed color pair: a black-headed female and a red-headed male. The first year my pair went to nest at the end of October. I

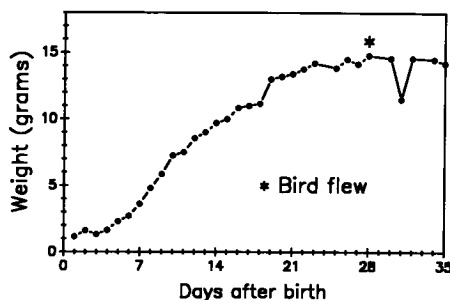
managed to foster five babies under Societies. My attempts to store Gouldian eggs for any length of time failed. Eggs stored at room temperature (70°F) for more than two days failed to hatch when incubated by foster parents. I also incubated eggs artificially in a Roll-X incubator. Setting was 99.5°F and 50% humidity. Three eggs out of five hatched and one chick survived for five days. Autopsy of the chick showed a generalized infection by gram-negative bacteria and a lesion on the mouth. At the time, I was using Roudybush handfeeding diet (regular) diluted in Gatorade, and I was feeding the chick with a tiny spatula. The spatula was responsible for the mouth lesion. The second clutch was fostered under Zebras, which did a very good job and raised all the babies faster than the Societies, but the third clutch came too early and found me unprepared for fostering. Because the hen was sitting tight, I waited hoping that she would continue until hatching. However, on day 15 I checked the nest and nothing was there. It did not take long to realize that the male had cleaned up the nest after the eggs had hatched. I found two nestlings on the floor of the cage, but one died shortly after. The survivor was gaping and begging, so I decided to hand-feed this chick from day 1.

The day-old baby was placed in an aquarium brooder with a temperature of 95°F and 60% humidity. For the first three feedings I fed only Pedialyte (every hour), heated to 105°F. Then I started feeding the diet described in table 2, diluted with Pedialyte to a very liquid consistency. The thickness was adjusted so that the crop was totally empty every 1.5 to 2 hours. To feed the baby I used a paint brush through the fourth day, then a pipette, followed by a syringe when the crop was dilated enough to empty only every 4 hours. Finally, when the food became nearly solid I used a thin, wooden spatula.

The chick was fed every two hours around the clock until it reached a weight of 5 grams (at birth the bird weighed 1.2 grams). The night interval was between 1:00 a.m. and 5:00 a.m. The parents, of course, feed the babies more often, about every 15 minutes, but the hand-feeding procedure causes an enlargement of the crop so that it empties every two hours on average. When the feather tracts started to appear

through the skin I added peanut butter to the diet, and thickened it somewhat. I banded the chick (size D) at day 14 and it flew at day 27. The weight chart shown is a daily record of its weight gains. Weaning was slow and difficult, and was effected by leaving the baby with older, independent siblings, while still feeding it at least four times a day. The weight chart shows a notch caused by a sudden drop in weight at day 31. This occurred because I tried to decrease the feedings too quickly. The weaning process was played by ear, looking at the weight gains or losses. Every time the chick would lose more than 10% of its body weight, I would increase the feedings again. There must be a better way to do it, but my method worked and the bird finally weaned.

**Growth curve of a Gouldian Finch, hand-raised from day 1.**



I designed my diet based on the knowledge that the shorter the time a bird spends in the nest, the higher the protein content in the diet must be<sup>17</sup>. The Budgerigar, for example, spends an average of four weeks in the nest and needs about 20% protein in the diet. So, finches, spending about three weeks in the nest need a rather high protein diet. Another important consideration is that the content of fat in the food determines how long it will take to go through the crop. The higher the amount of fat, the longer the transit time. The stay of the food in the digestive system of the bird should be such that there is enough time for the proteins to be adsorbed, but not long enough for the food to become spoiled or hard, which could cause food poisoning or crop impaction. Spinach and carrot baby foods were added to make sure that the chick's crop would not become impacted. The presence of fruit and vegetables prevents formulas from becoming stone-

hard, which tends to happen often, particularly with products that do not need to be cooked. The  $\beta$ -carotene of the carrot helps in the development of the bird's coloring. Spinach contains beneficial calcium.

Several examples of successful hand-feeding of very young passerine chicks have been published<sup>18-20</sup>. The most in-depth report is listed in reference 21. The methodology described in this article is rather complicated, requiring laboratory equipment and bee cultures. An aviculturist friend of mine, Mr. Tony Hollauer of Bridge-

**TABLE 2  
Hand-feeding Diet for  
Lady Gouldian Finches**

2 teaspoons Nutri-Start Baby Bird Food (Lafebre)  
3 Tbsp. cold water

Cook according to the instructions of the manufacturer in a double boiler or in a microwave, stirring often.

Add:

2 tspn. purified soybean protein  
1 tspn. Nekton Tonic-K  
1 tspn. strained Creamed Spinach (First foods)  
1 tspn. strained Carrot (First foods)

All through the development, add to one daily feeding:

1 pinch of Prime (Hagen)  
1 pinch of Nekton MSA ground in the mortar to a fine powder.

When the feather tracts start to be visible through the skin (about day 8), add one flat teaspoon of creamy peanut butter to the formula prepared as above. Also, every other day, add three drops of cod liver oil and 1/8 teaspoon finely ground cuttlebone to one of the feedings.

**TABLE 3  
Hand-feeding Diet for  
Cordon Bleu Chicks**  
(from Tony Hollauer)

Dry Ingredients:

1 volume Avi-Start Hand-feeding Nestling Food (L/M Animal Farm, Pleasant Plain, OH)  
1 volume Nestling Food (Abba Products Co., Elizabeth, NJ)  
1/2 volume finely mashed, hard boiled egg (no shell)  
1/2 volume finely chopped greens (spinach, collard, kale or carrot)

Add hot water to runny consistency. Feed fresh every time at 105° to 110°F.

port, Connecticut, has successfully hand-raised Cordon Bleu chicks twice. The birds were rejected nestlings at day 5. The diet he used is described in Table 3.

### Conclusions

The Lady Gould Finch is a simple-to-care-for beautiful bird, well established in American aviculture. It can be successfully hand-raised from day 1, although I do not recommend this outside exceptional cases. The procedures and diet formulas for the hand-feeding can be used to raise other more difficult species. Keeping and breeding Gouldian Finches is a useful avicultural experience that can form the basis for approaching other more difficult, less well known species, which must be established in captivity for their future survival on the planet.

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