

PEKIN ROBINS

Information on their Care and Breeding

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The following notes have been prepared to assist participants in the Pekin Robin breeding consortium. Additional information is available for the breeding of food insects. Notes on ailments and treatment are still in preparation. Findings in this essay are based on three years of breeding Pekin Robins with 17 nesting and 27 successfully raised offspring.

Biological Considerations

The Pekin Robin (*Leiothrix lutea*) also called Red-billed Leiothrix, Chinese or Japanese Nightingale belongs to the Order of Passeriformes (perching birds) Family of Timaliidae, the babblers. The Pekin Robin is a typical soft-bill bird in the context of aviculture and requires corresponding diets and care differing from seed eaters, such as finches, sparrows, quails, doves and psittacines (parrot family members often referred to as hook-bills by bird fanciers).

Pekin Robins have been popular cage birds for close to 100 years. They are very colorful, fine singers, active and hardy, long lived birds which do well in captivity. Their cheerful behavior and intelligence make them delightful birds to own. The species is long lived with records approaching 20 years in captivity.

Birds, mammals, and reptiles are at times grouped according to their predominant food intake, for example: carnivores (meat eaters), herbivores (plant eaters), insectivores (feeding on insects, spiders and other arthropods), frugivores (fruit eaters), nectarivores (feeding on nectar) and omnivores (feeding on a mixture of several food groups). Pekin Robins lean towards the insectivore and fru-

givore group, but consume constituents of other food groups as well.

This becomes an important point of consideration to accommodate the dietary and behavioral needs of the birds and the daily care routine. Pekin Robins must have a varied diet with live insect supplements, particularly for the breeding of this species. Pekin Robins can be observed picking up "finch" seeds, however these are not suitable as a source of essential nutrients. Pekin Robins can not shell seeds and do not have a crop like seed-eaters to aid pre-digestion, or a very muscular stomach, partially filled with grit, to break down the seeds to digest them effectively. A Pekin Robin may pick up some seeds, but passes them through for the most part and would in time starve to death, unable to digest them. Plants count on this by luring soft-bill birds to their colorful fruits to ingest the fruit, but then to pass out the seeds, unharmed, for dispersal to produce new plants elsewhere. Germinated seeds are on the other hand a more suitable food source.

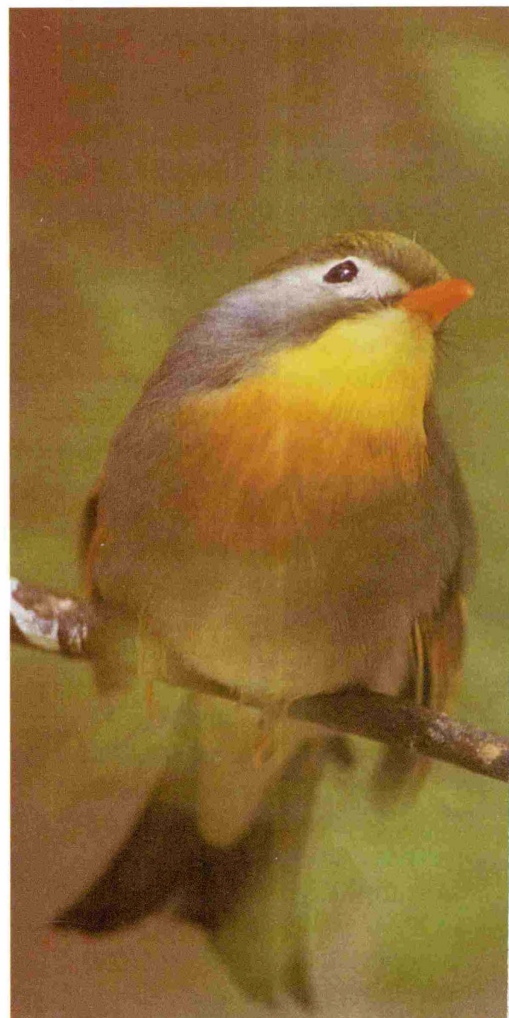
Another consideration is the species' natural way of food gathering as an insectivore and to an extent as a frugivore. It requires constant search for insects and ripe fruit within a habitat of great diversity in plant and animal species and habitat form. Pekin Robins live in the underbrush of mountain forests with small clearings and creeks. They will also visit cultivated lands such as gardens and fruit plantation to search for food. Their natural behavior results in relatively long periods of food gathering interrupted with short rest periods.

To accommodate this and to enjoy observing their fascinating

behavior we must provide them with larger enclosures with a simulated bush habitat. Pekin Robins and most other soft-bill birds usually make a pitiful display in barren, small conventional cages. Their need for activity causes them to display, and unfortunately to acquire, stereotypical behavior, by going through a short, constantly repeated routine of movements. In addition, they often damage their otherwise splendid plumage, which they keep in immaculate condition in a suitable environment.

Pekin Robins live on the southern slopes of the western Himalayan mountains to the east of China. They can be found in mountain forests to an elevations of 2700 m, which makes this species relatively hardy for an "exotic" cage bird. Pekin Robins can tolerate subfreezing temperatures, provided they have been conditioned to the proper sequence of seasonal

Photo by Peter Karsten



Male Pekin Robin

changes and that they have a large, partially covered and wind protected enclosure. They must always have access to unfrozen food and water. Birds could perish if they do not have water and food available to them for more than 24 hours.

Ideally the outside aviary is connected to an indoor shelter with temperatures above freezing. The food is offered in this space to habituate the birds to come inside so that they can be locked in if particularly windy, wet and cold weather is predicted. Cold weather causes additional stress to a bird in marginal condition, during molt, following a demanding breeding season, and, of course while fighting any form of illness. There is no incentive to establish durability records. The author routinely brings the birds into protected shelter if outside temperatures drop below freezing. Nonetheless, the climatic tolerance allows us to create a well planted, unheated outdoor habitat for the birds, less

expensive to construct and maintain than environments for other exotic bird species.

The creation of a close to nature aviary habitat can be looked at as an art form in itself, one that is aesthetically rewarding, educational, entertaining to the observer, and highly beneficial to the well-being of the birds. A natural well planted environment of sufficient size makes regular cleaning and maintenance a small task since the proportioned amount of space per bird is relatively great. This is important as it eliminates disturbances during the nesting period.

Establishment of a Breeding Pair

The sexual differences in the plumage and body are very slight. They may be obvious to the owner and experienced aviculturist, but not on first sight. Sexing this species by their appearance alone is not reliable.

Generally the male has a distinct white edge on the two extend-

ed upper tail coverts, which look like shorter tail feathers. The female has a relatively finer line or no white edge marking on these feathers. One must be careful not to draw conclusions if the white markings are not visible. The particular feathers may have fallen out. They seem to be not as strongly seated as the true tail feathers and birds which have been in transit may have lost them. Furthermore, some females show rather prominent white markings.

Pekin Robin keepers use another appearance clue, which is the facial patch of whitish gray around the eye region. It is more distinct in the male and stands out when looked at from a distance, while it is less defined in margins in the female. This only works if one is quite familiar with the images or if both sexes can be seen side by side. Beyond this the male is slightly more colorful.

Vocalization and Social Needs

Vocalization and song are high-



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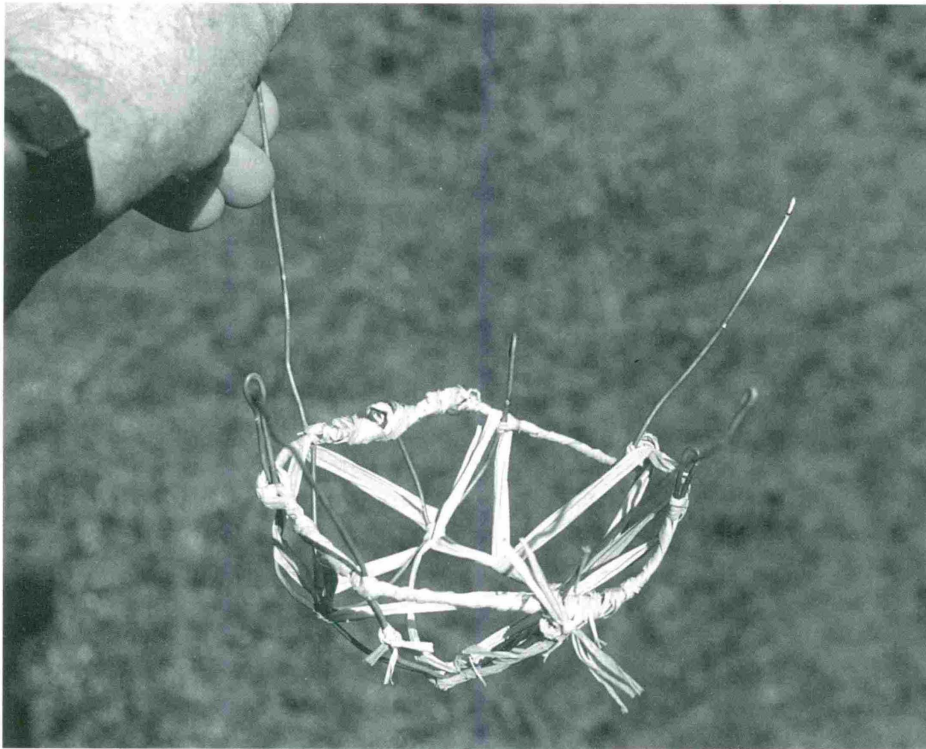
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ly developed and diverse to suit various situations. The male begins to sing already when five to six weeks old. The adult male has a form of signature song. It is given when the male calls the female in response to her call, especially if the birds become visually separated. This song is similar from male to male. If taped and played back to an isolated female, it will trigger her typical response call. The female has a plaintive call of four to five repetitive notes which is more of a cry than a song. These calls between the male and the female are quite different and generally serve well for sex identification. For this the bird in question is separated from other Pekin Robins and a tape of Pekin Robin vocalization is played. Both male or female will respond and the observer can then single out the particular bird's call. The male can, however, emit a call like a female, particularly if he is very frightened and separated from his mate. In some 30 birds, the author has never heard a female sing like a male.

There are other calls; a scolding call, in which others often join in, is an uninterrupted series of

harsh chattering sounds; a short warning note, a "churp," is sounded and causes birds to dive for cover; and a constant uttering of a short quiet note, sounding like "chuck" is voiced to stay in contact, especially if new territory or a new object is inspected. The female has a low key whining call when she invites the male to mate. The song of the nesting male is softer and more varied than that of a single male attempting to attract a female. There are other forms of vocalization at the nest site and during courtship.

As a note of interest, Pekin Robins learn much of their singing skills from other singers, this is why wild caught birds are usually great singers. Captive raised birds will learn to extend their skills by listening to good singers and can be taught by way of using electronic recordings. There are many observations where they learned to include parts of songs or notes from native birds as well. It is true that a single male is apt to sing considerably more than a paired bird, simply because he is endlessly trying to attract a female. Pet traders may point this out as a plus, but knowing

the reason may cause us to develop guilt feelings as we listen to the desperate effort to find a companion. Keeping a lone male (or female for that matter) is biological incorrect for this highly social species and rather selfish; notwithstanding that we have an obligation as keepers to breed this species in captivity in light of their conservation status (CITES Appendix II).

Pekin Robins are in great need of companionship and suffer emotionally if kept as an individual bird, unless the keeper effectively replaces this role and spends inordinate amount of time with the bird. Pekin Robins sleep huddled together as pairs and juveniles as groups at night, which indicates their need for contact. While Pekin Robins can become quite tame, it should not be recommended for a "one on one" pet. Besides, so much of the delightful behavior seen only when birds are paired is unobtainable by keeping a single Pekin Robin.

Housing

Cage bird literature gives guidance for the caging of birds. Usually the conventional dimensions given for Pekin Robins are of absolute minimum and are inadequate to breed the species or to accommodate their behavioral needs. To keep a pair with eventual breeding in mind and even as display birds requires an enriched habitat-enclosure to enjoy this species at full potential.

Even for maintenance, the author considers a 1m x 1.5m x 2m high (3' X 4'-6" X 6'-6" high) a minimum to create an enriched enclosure. Two and perhaps three sides could be solid, depending on how it is best viewed. Pekin Robins are understory dwellers and actually like the "boxed-in" effect which simulates dense bush better than a four-sided meshed cage. One side could be glass as well. Understandably not everyone can commit this much space inside a home, but, as mentioned, an outdoor planted aviary is

ideal in combination with a sheltered indoor space. Where the local climate does not make the outdoor keeping practical and an indoor enclosure is considered, one should attempt to mimic the seasonal temperature changes and changing day length to house the species more naturally. Breeding is much more successful if normal seasonal changes are represented. The ideal facility has an outside aviary connected to an indoor shelter.

Pekin Robins are stimulated to breed by lengthening photo periods in the spring. The literature suggests that increasing hours of day light (12 hours plus) are necessary to induce breeding behavior. This must be given consideration when birds are brought into a home for the winter where they are exposed to extended days by artificial light since it can cause renewed, out of season, nesting with usually dismal success.

While we often hear that an aviary should be as big as we can afford, there is an optimum from a management perspective. If the roof span is too great, it needs to be watched for snow load and built more expensively and heavier, which would make it chunky and disproportionate to the size of the birds. Only one pair can be bred in a common space, unless we create a huge walk-through aviary. A planted space can become too large to monitor the birds and locate the nest for banding the chicks. It is more enjoyable to have two suitable aviaries and two pairs for their more inspired singing.

A good viewing distance from the perimeter is four to six feet, depending on how densely it is planted. If the enclosure is too deep and the vegetation is quite dense, one has difficulty to locate the birds in the environment. A lesser dimension may be practical for surveillance and keeping the birds in view, but not advisable in order to respect the flight distance. This is the comfort zone which keeps the birds from becoming frightened and take flight or cover when approached. The

flight distance is different from bird to bird based on level of trust and psychological make-up.

Pekin Robins are by nature secretive when it comes to choosing a nest site and caring for the nestling. While birds become tame enough to take meal worms from a hand, they will "freeze" when they are near their nest and do not move until the keeper has left. If the enclosure is frequently visited, the birds may either get used to the intrusion or, much more likely, abandon their nest or young. If the aviary depth is six to eight feet, for example, the length could be up to twice that. To have the aviary much larger is not advantageous unless it is a walk through aviary. A 6x8x7 feet high aviary will allow us to provide sufficient "wild" habitat for the birds to breed and raise their brood. A mini landscape depicting the bamboo forest setting with some conifers, evergreen bushes and a small "water courses" is not difficult to establish. Pekin Robins love to bathe. A simple way to offer fresh moving water is a slow drip of water into a shallow bird bath.

The presence of running water has been noted in the literature as an asset to entice Pekin Robins to breed. Perhaps this relates to the diversity of a wetland habitat with its diversity of plant and animal species and insect life in particular. The assumption could be made that the birds recognize the potential supply of live food for the raising of their young, much like the female snowy owl which will gauge the numbers of eggs she lays proportionate to the number of lemmings the male will place at the nest site. One word of caution: young fledglings are attracted to water and there have been cases where they entered it and drowned. It is best to fill the deeper basins with pebbles during chick rearing time.

A landscaped aviary should have enough room to walk into the space for maintenance. It should have high perches at either end to give birds room to get away from the person cleaning the enclosure

and to give a long distance for free flight, even though Pekin Robins move more typically through the space via the underbrush cover.

Solid walls in the back and partially on the sides create a wind protected bay and a sight barrier. It may be most practical to cover the entire roof with translucent material to preclude nests being rained-out and chicks lost in days of rainy weather. The plants can be watered with standard flower bed irrigation equipment, to be turned on when needed.

Measures must be taken to eliminate rodents and predators. A 16 to 18 inch curtain of sturdy mesh wire extending from the bottom of the aviary frame downward into the ground at an angle is normally sufficient to discourage digging varmints from working their way inside. The mesh wire should have openings of no more than 1/2 x 1/2 inches. It is a

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good idea to paint galvanized mesh with a dark, flat color to make it easier to see through and to preserve it at the same time.

An out-door aviary should have a safety porch to provide a double-door-entry, so that there is always one door that can be closed between the birds and the "outside" when the aviary is entered or exited. The planting in the outside aviary is best done in the ground. Perches should be positioned to cause the least amount of droppings to fall onto the leaves. Once the birds have established their movement pattern it becomes obvious where most of the droppings are accumulating. It is here where patches of sand can be placed to allow for easy cleaning. It will take a period of adjustments to refine the arrangements.

The plantings in an indoor enclosure or an outside aviary with a wire mesh bottom to keep predators and rodents out, are best done in pots standing in a dish to catch surplus water. This way the sand covering on the floor or other bedding material will remain dry. An important consideration to keep the bacteria and fungus development down in the organic material which will accumulate on the ground. A dry substrate is an unsuitable environment for slugs and earth worms, both feared as intermediate hosts of the gape worm, a parasite to be avoided.

Due to the condensed space in the indoor enclosure there will be more deposits of fecal material on the leaves, but since we have the plants in pots it is easy to simply take them out and wash them off and return them or have an alternate set standing in the garden cleaned by rain and "sterilized" by the ultraviolet sun rays. As an alternative, freshly cut green fir or cedar trees can be placed in an enclosure in a bucket with moist sand to make do for vegetation cover. The trees hold out long enough to complete one or more nestings and are accepted by the Pekin Robins as well as the real thing. It seems the soft needled conifers are especially

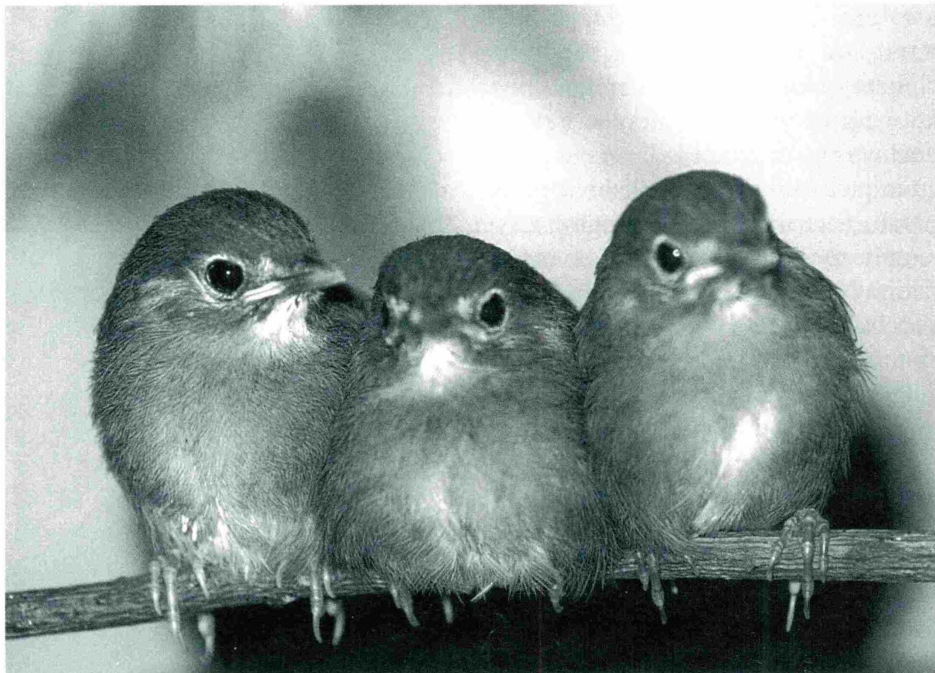


Photo by Peter Karsten

Babies about two weeks old.

favored for nest sites. The author considers the presence of live plant material essential to breed the birds and to offer psychological comfort the year round.

Conservation and Captive Breeding

Until 1989 efforts to breed were less critical, since Pekin Robins could be obtained with relative ease through the pet trade and lost birds could be replaced within a short time of searching for them. Now that the species is listed in Appendix II of the Convention on the International Trade of Endangered Species of fauna and flora (CITES), wild caught Pekin Robins can no longer be imported for the commercial pet trade. Special permits are required by the CITES authorities for the exporting and importing country. These birds must be captive bred and have closed, coded leg bands and proof of origin. Effectively, the pre-act population of imported Pekin Robins will disappear from the aviaries of bird fanciers as the end of their longevity is reached, unless national, coordinated breeding programs are established to have a self-sustaining captive population. A register of the birds, like a studbook,

must be established to avoid inbreeding and to maintain genetic diversity over the long term. This has begun in some regions.

Pekin Robins have been bred on many occasions, although not in great enough numbers to contribute measurably to the pet market. The low purchase price of imports made the captive breeding for commercial reasons unattractive. The time commitment and costs to provide consistent and varied live insect food for the rearing of the young could not be compensated by the going market price of wild caught Pekin Robins. This relationship will no doubt change with the scarcity of birds on the market.

One should not venture into Pekin Robin breeding for big profits since the species remains one with special care requirements beyond what is needed for much easier to keep finches and hookbills. It is not a bird to buy on impulse or as novice pet keeper without the guidance of an experienced softbill bird breeder.

Pairing Behavior

The pairing of birds is generally not a problem. The species is not very aggressive in their pair forming

behavior. The male will display to the female and follow her while showing off his wing markings, reminiscent of a butterfly, and attempt to get close to the female. She normally responds by staying in one spot and bobbing her tail slowly up and down while omitting a specific call like very soft cries. The male will not make contact at that time but continue to get closer, often hopping over her to the other side of the perch. As the birds get more confident they will start to preen each other. It could be the male or the female to be the initiator. Soon the birds will roost together and form a close bond. They mate for life. Carrying nesting material is the next phase, but actual mating is usually seen after the nest is substantially completed.

Nest Building

Nests have been constructed in about one week. Both parents work on the nest. It seems, however, that the male picks the spot by starting the first weaves of grasses in the crotch of a bush or small tree. One copulation suffices to fertilize the clutch of 3 to 4 eggs. Mating is noted for about two to three days until eggs are laid. Egg laying occurs shortly after the nest is completed. A pair which is established does not go through the staged courtship display as newly introduced birds do. If separated for even long periods they recognize each other immediately when reunited. The carrying of nesting material and nest construction is the obvious sign of starting a new family by an established pair.

The not very firm nests are built out of grasses, rootlets and dry bamboo leaves without any form of soft lining, which we see in native songbirds. Perhaps insulation is less critical in generally warmer climates. While the birds are quite capable in anchoring the nest cup, it seems safer to slip a support basket into the spot where they begin their nest. This must be done early on, while they are not too possessive of the nest site and while the birds are out

of sight. A support basket is made by bending wire into a 4 to 5 inch diameter circle to form the nest rim and connecting crossing wire ends to it, to create an open basket. The author wraps the wire frame with raffia to entice the birds to accept the basket.

As mentioned before, a good cover of bushes and evergreens is important to hide the nest. Suitable nest site and availability of nesting material go hand in hand. The birds look for dry grasses and particularly like raffia to start their nest. Raffia cut to about 8 inch long and spliced to fine strips about one eighth of an inch is used to start the nest bowl. Dry bamboo leaves, fine grasses and especially coconut fibers are welcomed to finish the interior lining.

The building of a good nest is no guarantee that eggs will follow. Other factors play a role: season, health, onset of molt, presence of live food in their diet, and, above all, disturbances influence the course of events. Privacy is critical.

Incubation and Hatching

The eggs hatch after 12 days of incubation. During the day the parents take turns sitting on the eggs and start incubation when the second egg is laid. The female incubates and later broods at night. She lays 3 to 4 eggs, rarely 5. The chicks hatch generally on the same day even though some eggs have not been incubated for the full 12 days. This likely accounts for variances in hatchling size. The last chick may hatch up to 24 hours later, but seldom after that. The parents will remove any left over egg shells and dead chicks from the nest and carry them as far as possible, at times pushing them through the mesh wire to the outside of the enclosure.

The parents only feed live or on the spot killed insects to their chicks. Mealworms, waxworms and crickets are the most common insects obtainable. Wild crickets, grasshoppers, moths, hairless caterpillars, spiders, small dragon flies, carpenter ants, ear wigs, larvae of wood borers and winged termites



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Feeding of Live Insects

The parents feed their young throughout the day during daylight hours. It is important to provide live insects on an ongoing basis by either bringing live food to the adults 4 to 5 times per day, from early morning to late evening, or by setting up self-feeders.

Self-feeders are plastic containers about 18 to 16 x 12 and 10 to 12 inch high which are placed in the enclosure. Once or twice a day live crickets and mealworms are dropped inside. They do not escape from the container. Chick starter and a piece of orange or apple is added to sustain the insects. It is helpful to prop a forked branch close to the bottom to give the birds a landing spot to get used to the self-feeder. Waxworms can not be fed this way since they can easily climb the smooth wall of the self-feeder. These are fed directly to the birds. It is recommended to crush the heads of waxworms and crickets for direct feeding so that they do not escape. A pair of tweezers can be used for this. To make crickets more manageable they can be moved into a refrigerator for a few minutes to slow them down. Live mealworms can be contained in a small glazed dish. Direct feeding allows for better monitoring of food consumption and behavior changes, but such time commitments can not always be made for the five weeks the chicks are depending exclusively on live insects food.

The amount of insects to be fed is gauged by consumption. A family of five can consume up to 300 insects a day. The parents will take a good portion themselves and eat less of the non-insect food during the breeding season.

Loss of Chicks

It is not uncommon to lose newly hatched chicks on their 4th to 5th day of life. The parents will

throw chicks out even if they are not dead at that time and it is not fully understood why this is occurring. The food supply is suspected. In the wild, parents may choose different insects to feed their chicks at different stages. After hatching, the chicks first have support from their remaining yolk sack content which may play a role in the timing for the change of required food constituents. It appears the chicks lose vigor in begging for food which diminishes the feeding impulse by the parents to become a progressive problem for the parent-chick behavior pattern. Changing food insects often restarts feeding interest by the parents and chick response. Spiders seem to be particularly conducive, as are other wild caught insects. Still, some chicks are abandoned.

Presumably the parents sense the chick's diminishing chance to survive and remove it in favor of the more vigorous chicks. This may well be a natural and not aberrant behavior in captivity. The author sees clear improvements in chick rearing success during July and August, when many wild insects can be caught by the parents in their planted aviary.

Abandonment of the nest rather than throwing chicks out is another behavior in this period. It can, however, also be triggered by severe disturbance. The chicks can be hand reared, which is usually successful once they are five or more days old.

A similar risk period lies within 3 to 4 days after fledging. It appears that chicks are again most likely lost at that time. Perhaps extra reserves stored during the nesting period are used up and insufficient food supply at that time cause energy loss followed by disrupted parent-chick (stimulus-response) behavior.

Under good conditions the healthy chicks will seek out a secure perching place and join each other to huddle together for several days while the parents bring the food to them. They will often remain in the

same place until they begin to venture out. If the chicks are disturbed they will disperse and gradually join up again. If a chick feels insecure (in a sparsely planted aviary) it will try to climb as high as possible. A weak chick can not reach a high perch and spends most of its time trying to get up on higher branches to work its way up to the other chicks. Huddling together conserves energy and reduces anxiety. A chick which sleeps or rests with its head hanging down is a weakened bird.

The next phase shows their inability to get off the ground and onto a perch. If the parents neglect to feed it or the chick does not accept food, the time has come to remove it for hand-raising. The endless effort to find a secure place will exhaust the chick and cause a stress related muscle burn out, muscle disorder and in severe cases shock.

This was demonstrated by a tame, healthy, hand-raised chick which fledged on the day the author had to travel for most of the day by car and was forced take the chick along to feed it periodically. The chick ate well and moved from perch to perch with few resting periods. It appeared to be exceptionally strong and active for a newly fledged bird. The next morning the chick was in shock, unable to stand on its feet and partly paralyzed with symptoms of "capture miopathy" or muscle burn-out and shock, often seen after wild animals have been severely stressed in a fight or flight situation. It took three days for the bird to regain its mobility and normal appetite. It was treated with warmth, absolute quiet and antibiotics as a safe guard and had to be force fed for part of the time. The chick grew up to be a strong bird.

To avoid anxiety in hatched chicks and the urge to work their way up in the enclosure, which often results in falls and constant retries, the enclosure must have denser plant cover from the ground up and, most importantly, be left undisturbed. A

clutch of four chicks with a small chick among them all remained close to the ground in a dense Salal bush for about one week before they began to fly and explore more of the aviary. A second clutch behaved likewise in another well-planted outside aviary, while several chicks in three previous clutches by the same parents were thrown out or died after fledging in an indoor aviary without dense bush cover in the lower region. Loss of fledged chicks is in the opinion of the author more attributed to environmental deficiencies than dietary matters.

Fledging and Weaning of the Chicks

The chicks fledge between 10 to 12 days after hatching. Strong and healthy chicks will fledge within hours of each other. At first they will sit quietly in the vegetation and stay together if the environment suits them well. They will continue to feed on insects alone until they are about 15 days old when the parents begin to feed other prepared food. A home made egg cake is the first non-insect food the parents offer, followed by fruit. Once the chicks accept egg cake the assurance is given for comprehensive nutrient supply and good progress.

The chicks can be weaned and left on their own to feed when five weeks old, but the parents will continue to feed them up to six weeks and longer if they have not started a new nest. Hand-raised chicks can be trained to feed own their own much sooner.

Re-nesting

Often the females will start renovating the nest and begin to lay eggs again within a week after the chicks fledged. The male will take over most of the feeding, but participate in the incubation of the new clutch of eggs as well. When that clutch hatches the fledged chicks are often less than five weeks old and not weaned by the parents. This causes confusion in the parents and

interference by the older chicks with the nestling. If they are not removed the subsequent clutch will likely fail or have high chick mortality because of it. To gain extra time, the nest can be removed after fledging of the first clutch to delay completion of a new nest by several days. One could also remove the older chicks and feed them by hand if necessary. This must be done where the adults can not see or hear them at all, because the parents and will desperately try to connect with the chicks if they have some form of contact. Pekin Robins are dedicated parents and will defend their chicks valiantly against intruders including humans.

Rather than encourage early re-nesting, it is better to spread out the hatching to reduce the drain on the reserves of the adults.

Diet Considerations

The food supply is a major consideration for the breeder. For non-breeding companion birds the provision of a suitable diet is not problematic, notwithstanding however that key components are usually not available at the average local pet store or pet food supplier. Softbill bird diets are manufactured by leading pet food companies as universal mixtures tailored to thrush-like birds, including Pekin Robins, exotic starlings and mynah birds. These mixtures have balanced constituents to provide all required nutrients and often minerals. Usually additional vitamins, minerals, trace elements and some essential amino acids are supplemented on a regular basis to the basic food mix at times of high demand.

It seems there are as many recipes for diets as there are keepers of Pekin Robins, which illustrates that the Pekin Robin can feed on wide range of food items. There is great value in using proven diets and composite mixtures. Mynah bird pellets contain the required nutrients in a balanced mixture, if the robins accept the product, technically only

water and some treats, mainly for occupational stimulation are needed to ensure the well-being of the bird.

In fact, complete foods such as chick starter have been included for that reason in many soft-bill diets. Zoological gardens are moving more and more to complete premixed diets for most of their animal species to avoid pitfalls, where individual animals hog some food items and deprive others of them or fill themselves on single items not containing all essential nutrients and so creating serious deficiencies to sustain themselves. By recognizing that animal body tissue is built out of protein, among other things, and that protein is composed of essential amino acids and, furthermore, that plants do not have all of these, (with the only known exception of the soybean), we can understand that animal protein is critical for growth and cell replacement. Some animals create their own missing amino acids in their stomach or cecum (cud chewing animals and horses for example) with the help of a symbiotic bacterium flora, but Pekin Robins do not. Animal protein is supplied via insects, egg food, cottage cheese.

The changes from one diet to another should be gradual. It is important to obtain the diet and or food samples from the previous owner to make the change-over. An unfamiliar food offering combined with transfer stresses and confusion due to new surroundings can affect the condition of a bird quickly. We can ensure that the food is at least familiar to help the acclimation process. Again a maintenance diet should not be difficult to provide.

Insect Food

The provision of a diet to bring birds into breeding condition is a different matter. Clearly the offering of lots of insects and at the same time *different* insects is vital to entice the birds to get into a breeding mood. Once on track the high protein insect food must be upheld to support the reproductive demands on the birds,

especially the female, which must produce the eggs. One egg weighs about 3 grams and a clutch of four is approximately equal to a half of her body weight! Once the eggs have hatched the greatest demand for live insect food must be met, since the hatchlings are fed only live insects by their parents. Occasionally frozen and thawed insects are accepted, but only in small amounts and not by all parents. Perhaps this is an innate behavior to ensure the food is of good condition. Breeders have also noted that there must be a variety of different insects to keep the parents' interest up to feed their young. If only meal worms with consistent appearance are offered, the adults seem to lose their enthusiasm to feed their babies. This can be reversed by mixing freshly shed larvae, freshly pupated larvae and hatched beetles which are white in color before the chitin hardens. While we know that the same species of insect is fed and nutrient constituents are very similar, it seems to give the birds the message of providing a variety of insects. A variety of insects provides a greater variety of food components, seemingly the feeding behavior of birds is keyed to this.

Besides meal worms (the larvae of the darkling beetle), crickets, grasshoppers, earwigs, wax worm (the larvae of the wax moth) can be offered. Grass hoppers and earwigs can be caught seasonally, while the others can be bred in cultures set up for that purpose. Maintaining the insect cultures requires special facilities and extra time commitments, but it is often the only way to ensure that a variety of food insects are available when needed. Meal worms and crickets can be purchased at local pet stores, realizing that the cost will be considerable to raise Pekin Robins on purchased insects. A clutch of three babies and their parents consumed over 300 food insects per day during part of the nesting period.

Drinking Water

Providing a form of a nectar drink in a small drinking tube has advantages. It provides the birds with extra energy. A 10% to 20% sugar/water stock solution, which is kept refrigerated can be offered free choice to the birds. One can add carrot or fruit juice, roughly about one fifth of the volume, to it. A water soluble vitamin/mineral supplement could be added as well and if need be, medication. The birds ingest some amounts of carotene this way on a regular basis to enhance their plumage colors. The birds have a tendency to partially lose their yellow and red pigmentation and green coloring in captivity.

The tube drinker is placed near the food dish. To his amazement, the author observed the parent birds dip a meal worm into this drink on hot days prior to feeding it to their babies, to help them maintain body fluid levels, and with equal astonishment watched them dip a meal worm first into the drink and then into the mineral dish to transfer mineral fragments. The birds do not consume all of the nectar drink every day. Water is also taken at the bird baths. The drinker provides generally cleaner water which is a plus and even plain water makes sense to be offered in these receptacles. The nectar drink should be replaced or removed after 8 to 10 hours during hot weather, to avoid problems resulting from possible fermentation of the sugar-rich substance.

Dry Food Mix Example

Dry Ingredients:

- 10 cups Universal soft-bill food
- 10 cups Mynah, Cockatiel or lory pellets (small size)
- 1 cups diced raisins
- 1 cup diced figs
- 1 cup diced dried fruit
- 1 cup diced almonds

Moist Ingredients

To make the food more palatable it should be moistened. Carrot juice is added to the mix to slightly

soften the pellets. A supply for several days can be prepared and stored in a refrigerator. Diced fresh fruit is added daily. Blueberries, strawberries and huckle berries are favorites with most birds. A slice of orange is provided daily and partly consumed, particularly in hot weather. Many other fruits and some vegetables can be tried.

Other Items

A staple component is used by the author is a form of home-baked egg cake (recipe below). It is cut in 3 to 4 mm ($\frac{3}{16}$ ") slices then covered with a touch of margarine and dusted with mineral/vitamin powder which sticks to the cake and margarine. The slices are then stacked and sliced again in the other direction to obtain small cubes. The birds will swallow the cubes whole without waste. If the cubes are cut too large the birds will work on them on the perch and waste much of it. All of the egg food is consumed daily and none of the costly vitamin /mineral supplement is lost. The egg cake and the dry food mix are fed at a ratio of one to one per volume.

Food Presentation

The food must be replaced daily and dishes washed carefully. Two sets of feed dishes simplify the feeding routine. During hot weather it may be necessary to feed freshly prepared food twice a day, with half ration at a time. It is best to feed the birds early in the day and at the same time. Slide-out trays to hold the food dishes are very practical to avoid escapes of the inquisitive birds. They make it unnecessary to open the actual enclosure door. This is a good feature for unfamiliar people who carry out care duties when the owner is away. The best location for the food tray is inside the safety porch or inside the shelter to eliminate escapes if the tray is accidentally not pushed back into position.

The drinking tube is placed next to the food tray and so is the mineral dish to supply crushed egg

shell and other granulated minerals to entice consumption. The feeding station should be positioned at a comfortable height for the keeper to serve. It should always be off the ground to prevent contamination with the substrate. If fecal material accumulates at the station, perches may need to be moved or a small roof can be mounted over the feeding tray. This is also helpful for bird baths which get contaminated by droppings. A small clear plastic shield works well. Freezing of food has been mentioned. Where this is difficult to prevent one can mount a low wattage light bulb which reflects heat towards the water and food.

Egg Cake

This is a high protein cake to supplement the diet to ensure sufficient animal protein is provided, especially during times of high demand and during the winter when fewer insects are offered. The parents feed this egg cake as the first non-live insect food to their fledglings with excellent results as far as the development of the young birds is concerned. The adults were observed dipping the cake into their drinking water on extremely hot days, to transfer water to the young by feeding the wet cake bits to them.

Recipe:

Preheat oven to 350 degrees Fahrenheit. Line four loaf pans (about 3 1/4 x 7 x 2 1/4 inch high) with waxpaper. Or use two larger ones.

Ingredients: 1 1/2 cups unsalted margarine, 1 1/2 cups sugar, 6 eggs, 2 cups of flour, 1/2 cup of soy protein/flour (from health food stores) and 1 teaspoon baking powder.

Cream margarine and add sugar. Beat until very fluffy and light (this seems to be important). Add eggs, one at a time, and beat well after each. Add dry ingredients and divide batter between loaf pans. Bake for 50 minutes or until done. Take out of the oven and leave the pans for about 10 minutes. Take

loaves out of the pans and cool on racks with paper left on. Let cool and feed or freeze for future use. The loaf in use is kept in a refrigerator in a plastic bag to retain its moisture.

The over all aim in preparing a comprehensive diet is to offer a large spectrum of nutrients and food constituents to ensure that all the building blocks are offered for the birds to build and maintain their bodies, reproductive functions and robust conditions. This, as with other species, is specialized to fit a specific niche in their biotope or natural home range which urges us to simulate their natural food and food gathering parameters to have physically and psychologically well adjusted birds. Insect eaters clearly consume a lot of chitin as roughage which must be provided in their diet.



Adult Pekin Robin with a waxworm. After hatching, chicks depend exclusively on live insect food for their first five weeks.

Minerals and Vitamins

Mealworms are the stand-by for most Pekin Robin keepers, but aviculturists caution not to feed too many. This can cause eye infection, foot tissue problems and obesity. It is assumed that high consumption can interfere with vitamin absorption. An offering of 10 per day is considered safe with combined vitamin provisions. Waxworms are a much relished food, but these too can cause mineral

deficiency and obesity. Crickets have a better nutrient balance and more roughage than the former. Interestingly, many Pekin Robins are however not interested in feeding on crickets outside the breeding season, especially if waxworms and mealworms are offered.

Minerals and vitamins are crucial for the rearing of chicks. Culture-raised mealworms, waxworms and crickets are deficient in calcium and vitamins for growing Pekin Robins and especially young chicks which live on these exclusively until close to weaning age. This can easily cause growth problems and health problems, particularly rickets. It is critical to supply the chicks with the supplements. Often this is done with powdered additives to the diet. The insects are poor vehicles to transfer the powder if it is dusted on them since the parents will prepare the insects by banging them against the perch, and pre-chew them, which removes nearly all of the supplement. Particularly if predominantly waxworms and mealworms are fed one can expect calcium absorption problems.

This is aggravated if the insects had been raised on wheat bran instead of poultry starter. Bran is high in phytic acid to cause binding of much of the calcium and makes it to an extent unavailable to the chick's body. The author has encountered rickets symptoms in chicks early and late in the breeding season by only dusting the food insects with supplement powder. This was overcome by injecting a water/vitamin-mineral powder solution with a syringe into wax worms and mealworms before offering it to the parents. The solution is made as concentrated as practical to still allow it to be forced through a hypodermic needle, which should not be too fine. Injection is done with a 23 gauge needle and no more than 2 to 3 drops are placed in each worm so not to cause too much pressure which will force the solution back out. Insects will die instantly if so treated and must be fed immediately to be accepted by the parent birds.

Photo by Peter Karsten

Enough insects are injected to allow for 2 to 3 insects per chick on one feeding per day. This procedure eliminated any symptoms of weak bone or beak growth. The author will also try to add a very slight margarine coating to the live larvae and then add powdered supplement to deliver it to the chicks via the parents.

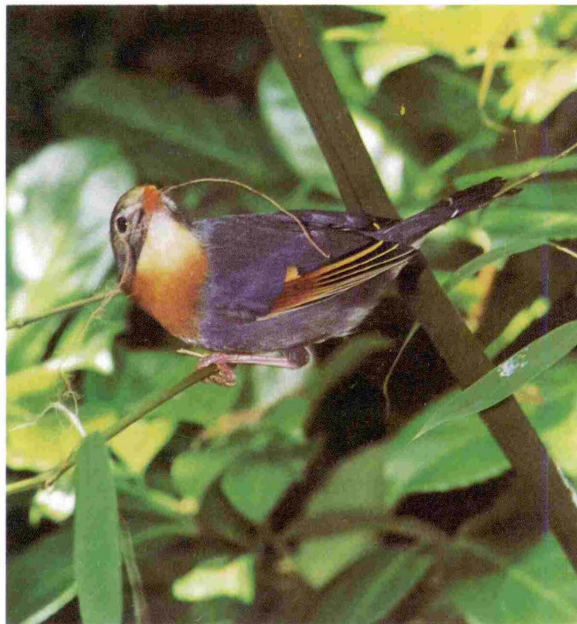
Incidentally, the administration of Ivermectin or other drugs works well by using a 1cc syringe to inject the measured amount into a worm or pupae and feeding it directly to each bird.

Adult and weaned birds are provided free choice with commercial, granulated mineral mix and crushed eggshell in a separate dish in their aviary. Eggshell should be baked in an oven to sterilize the shell to eliminate any transmittable poultry disease that could infect the birds.

Capture and Handling

The less the birds are physically handled to move or treat them the better. Particularly chasing birds by capturing them in a hand net is very stressful and risky. Planted aviaries make this also very difficult. The author has designed his aviary system with shift boxes that are routinely used by the birds to move from the inside to the outside enclosures. The facility lay-out allows birds to be transferred to other flights through these shift boxes. If birds need to be handled they can be trapped in the removable shift boxes. Shift boxes are simply connections between enclosures with slides at each end. From the box the bird can be driven into a net held at one end and secured without much stress.

A portable trap cage is employed to easily capture a bird in the aviary. It can be 18x10x12 inches high. Floor and end are of plywood, roof and sides have plastic fly screen to avoid injuries and to keep bait insects inside. Both ends have drop slides, one is connected with a



Male carrying nesting material.

draw string. The other end has an additional slide track for a square aquarium type fish net. If a bird is caught the net is slid into the second track and the slide door panel in front of it is raised to allow the bird to bolt into the net. The trap can be darkened with a cloth to cause the bird to flee towards the light and into the net or the bird can be encouraged to enter the net by moving a hand through the opposite door. The net-bag should be sock-like to make the bird drop deeply into it without being able to find its way back out. The slide at the net end is dropped as well. The trap can be placed in any flight and baited with mealworms.

The Pekin Robins are highly curious creatures. Usually the birds are caught within minutes and can be caught repeatedly. The gentle handling lets them soon forget the experience which cannot be said if they see a capture net in the hand of the approaching keeper. Stubborn birds can be held off food for several hours and then offered mealworms or waxworms in the trap cage. Two hooks are fastened to one side to simply hang the trap cage at any desired spot on the aviary wire.

Moving birds through unfamiliar corridors or towards the trap cage

is done by placing perches into the potential flight path. Pekin Robins can not resist the opportunity to inspect new territory by landing on a perch leading to it. Likewise an escaped and confused bird can be easily returned if a convenient perch is placed at the cage entry. The author always has a few bamboo sticks handy to move birds from place to place.

Weight checks are most revealing to assess a bird's progress and condition. This is best done with a digital read-out letter scale. A food dish with mealworms is placed on the scale and the scale is turned on to read in grams. The alighting bird will increase the sum by its

body weight. Most scales can be set to zero after the dish is placed on the scale to display the net weight. Healthy adult Pekin Robins should weigh between 22 and 26 g. A large male may weigh more than that.

Shipping boxes and small transport cages which are built with 1/2 x 1/2 inch mesh wire should always have a lining of fly screen on the inside or be replaced with a finer mesh wire. Confined Pekin Robins and many other birds do not give up their attempts to get through the mesh wire and often severely injure their facial tissue in the process. This results in the formation of scar tissue and permanently damaged and disfigured head plumage. Many splendid birds have been ruined by inappropriate containers this way.

Boxes for air shipment must conform with specifications established by the International Air Transport Association (IATA). The information can be obtained from air cargo carriers.

Banding of the Chicks

Banding may become mandatory for captive bred birds covered under the CITES in the future. Even now Pekin Robins cannot be exported or imported without permanent ID. The closed bands can only be

put on the bird when it is in the nest and the foot joint is small enough to pass the ring over it. The recommended band size is "K" which has an inside diameter of 3.94 mm. In the author's experience, it must be applied before the chicks are nine days old. The target day is day eight, at which time the chicks have a good covering of down and pin feathers to help conceal the ring from the view of the parents. There have been reports that the adults tried to remove the "foreign" object by pulling the band, chick included, out of the nest. They try to keep the nest meticulously clean until the young begin to defecate over the rim of the nest. In the earlier days the feces is presented by chicks after feeding in fecal bags which are taken far away from the nest by the parents, hence the impulse to remove strange objects.

The author had consistent success without abandonment of chicks if the parents could be shifted out of sight and also sound if possible. A good lay-out of the aviary is most helpful in this situation. If the chicks are handled gently at day eight they usually do not vocalize at that age. A trace of vegetable oil can be applied to the chick's foot for lubrication if needed, but the oil must be wiped off again, so not to soil the feathers of the siblings. It is helpful to offer the parents live insects just as they return to their nest area to get them busy in delivering food and mobilize the fearful chicks which will press themselves motionless to the bottom of the nest after banding.

The bands have serial numbers and are registered with the issuing bird club. The color and date of the aluminum bands change from year to year. Closed banding is the permanent ID of a bird and essential for studbook keeping and exports.

Chicks are held in one hand which also controls the chick's hind toe to align it with the leg to be banded, while the other hand slips the ring over the three front toes and slides it far back enough to release

the hind toe forward again.

Predators

Raccoons, owls, cats, mink and rats are nocturnal predators which can cause the birds to panic and fly against the wire where they are injured or killed. A covered roof eliminates many of the dangers and a small guard fence to lead house cats and dogs away from the aviary front helps to keep the birds at ease. Fortunately most Pekin Robins sit tight at night, if they are given a good roosting spot among vegetation and thus do not bolt if a predator contacts the aviary. Some individuals like to roost high in the

aviary, hence a covered roof is helpful. Besides carnivores, even rats are a problem if they make their way inside, as they will seek out the birds at night and attack and kill them on their perch. Where rats are known to be in the vicinity, the enclosures must be checked regularly to see that they have not gained entry by chewing openings into wood walls etc. A small night light is recommended to give the birds help to find their roost again or the nest should they be disturbed. Pekin Robins become quite well adjusted to friendly pet dogs or cats and show no stress if they pass by their cage. ❖