

Husbandry and Management of *Eclectus Roratus*

by
Jim Ellis and Karen Goode
Westerville, Ohio

Eclectus parrots are members of a monotypic genus that exhibits extreme sexual dimorphism in coloration. Males are generally green overall with patches of red, blue and yellow beneath their wings, on their body feathers and on their tail feather tips. Females are generally red overall with patches of purple, blue and yellow on their wings, body and tail feathers. Females as adults have black upper and lower beaks whereas the males have bright yellow/orange upper mandibles. Immature birds generally have black beaks flecked with yellow or orange. The feather coloration of immature birds is that appropriate to their sex as soon as they begin to lose their charcoal gray down feathers.

Forshaw (1973) and Low (1980) report eight to ten races "the males of which are difficult or impossible to distinguish." At one time these birds were considered to be two distinct species

due to the color which today is recognized as a sexual dimorphic character (Forshaw, 1973; Austin, 1961). The taxonomic history of this genus is rather sketchy and beyond the scope of this paper; however, in reviewing information on past breeding records of birds in captivity, this group is listed as the genus *Lorius bodaert* by Prestwich (1950-52) and the Duke of Bedford (1969). Currently, however, the group is recognized as the genus *Eclectus wagler* as is evidenced in recent literature of Forshaw (1973) and Low (1983) among others.

This genus ranges throughout New Guinea, the neighboring islands of Indonesia and the Solomons, parts of northern Australia, the Moluccas Islands and the Lesser Sudan Islands (Low, 1980; Forshaw, 1973). Forshaw (1973) additionally reports them as being introduced to the Palou Archipelago of the Pacific and the Goram Islands of Indonesia. This species

generally inhabits lowland forest and has a wild diet consisting of fruits, nuts, seeds, berries, blossoms and nectars.

Eclectus parrots have apparently been held in captivity as early as the 1800s with Prestwich (1950-52) and Low (1980) reporting the first successful breeding in Germany in 1881. Interestingly, Prestwich reports "hybrid" crosses between the twelve subspecies of "geographical variants" recognized at that time. The earliest zoo breeding of this genera may have been at the San Diego Zoo in 1931 although Prestwich does mention successful breeding at the Taronga Park Zoo, London Zoo and intermediate success at the Adelaide Zoo all during the 1930s-1940s. Prestwich (1969) reports as well a number of private bird breeders as having success with this genera in 1912, 1913, 1952 and 1968.

The Duke of Bedford (1969) reports that for that time period the average

Continued on page 36

DIET

Provided for each bird:

- 50 grams fruit mix (see recipe below)
- 12½ grams game bird starter
- 37½ grams Parrot seed mix
- 1 pieces of Old World Purina Monkey Chow — placed on top of diet — after soaked in freshly squeezed orange juice.
- ½ squirts Linatone vitamins
- ¼ teaspoon wheat germ oil

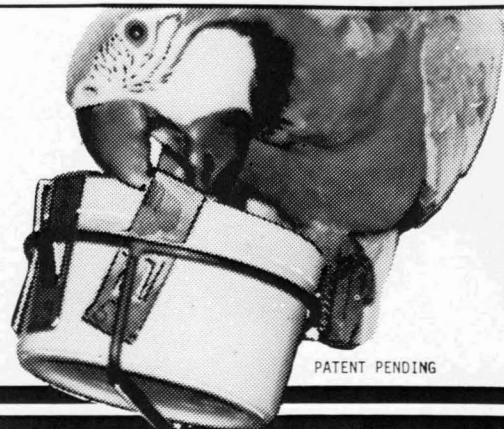
Mix ingredients thoroughly such that the fruit mix portion adheres to the seeds. This diet is varied on a daily/ weekly basis dependent on the weather. Increases are made as temperatures drop or as consumption indicates by the weight of edible remains.

FRUIT MIX FORMULA

- 1200 grams banana
- 1200 grams apple
- 1700 grams carrot
- 2100 grams potato
- 1200 grams orange
- 2000 grams lettuce
- 1185 grams Pigeon Chex
- 950 grams Purina New World Monkey Chow
- 300 grams Purina Old World Monkey Chow
- 950 grams Raptor Diet (commercially prepared)

This ratio of items are ground together, mixed thoroughly, and frozen in plastic bags (1000 grams/bag) to avoid dehydration. Thaw only the quantity needed as this mixture should not be stored thawed for more than 48 hours.

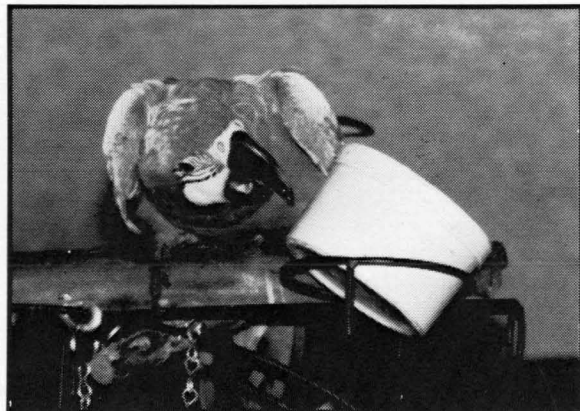
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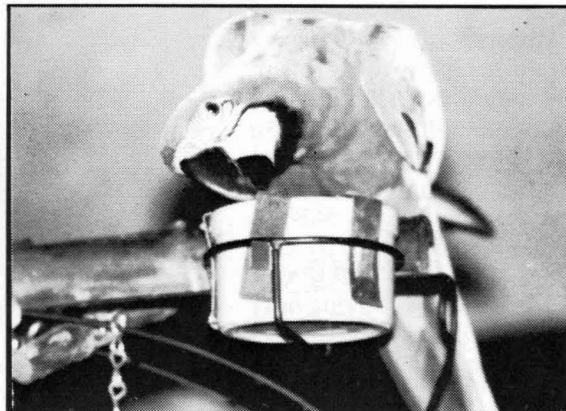
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Chick development at 29 days

survival in captivity of *Eclectus* was two to three years. Low (1980) states that captive breeding efforts in the 1970s appear to have been fairly widespread with 31 being bred in Britain alone by the "Parrot Society" members. The importation of this genus for the bird trade was reported by Nilsson in 1981 when she surveyed the U.S. trade in avian species. In 1977 100 were imported, 1978 is listed as having only 5 imports, 1979 is listed as having 94 live birds being imported out of 127 shipped, and 1980 Nilsson reports 312 live specimens being imported out of 353 being shipped.

The 1980 Census of Bird Breeding Program by the Zoological Society of San Diego reports of *Eclectus roratus roratus* 87 males and 78 females in collections with 21/17/5 being captive raised and for *E. r. polychloros* 22 males and 15 females in collections with 16/13/1 being captive raised. On the other hand, the International Species Inventory System (I.S.I.S.) mid-year species distribution report as of June 30, 1984 lists the status of *E. roratus* as being 54/47/5 individuals in 25 collections with the subspecies *polychloros* being represented by 2 males and 4 females in two collections. This report also documents that between July, 1979 and June, 1984, 61 new birds entered the population through acquisitions and hatchings. Based on this rather sketchy information and on personal experience with this genus, I would venture to state that a fairly large

population of *Eclectus* parrots probably exists in the U.S. alone within the combined zoo and private avicultural ventures. Although this may be the case it should be fairly apparent that this lack of data will hamper any future work with the genus should genetic management become a necessity.

Management at S.F.C.C. Teaching Zoo

Santa Fe Community College Teaching Zoo's involvement with this genus came about when in early 1981 the U.S.F.W.S. offered us several specimens from a seizure of imports. On March 25, 1981 the Zoo received two unpaired adult males and females from Brookfield Zoo where they were being held for the Service. No data on locale of capture, ages, etc. was ever available. Medical records that arrived with the



Chick at 29 days

Female chick at 40 days



birds indicated a possible exposure to psittacosis thus the birds were immediately placed on a prophylactic antibiotic regimen during their quarantine period. The treatment consisted of terramycin added to a cooked rice and game bird feed mixture alternated with a Nolvasan solution in their drinking water. This treatment followed an alternate schedule of four days for one drug then the other, and lasted for a total of thirty days. Each bird was treated separately during this period. The housing that was provided during this time allowed us to place the birds side by side in order that they might have visual contact with each other.

During this time pairing decisions were made which were primarily based on the sizes of the birds. It was hoped that by doing so we would avoid a situation of having dominance being exerted by a larger individual and, in fact, this procedure for pairing does appear to be a general consideration according to Low (1980). These pairings to this day have worked out extremely well, as will be seen later in this paper, and following the quarantine period these individuals were moved to their outdoor aviaries where they are currently reproducing.

The outdoor enclosures are located off exhibition on the eastern edge of the zoo grounds. These are sheltered by the zoo forest from the northern and western winds yet provide for year-round exposure to sunlight, rain and other environmental conditions. The enclosures themselves consist of 2.54 cm x 1.27 cm (1" x 1/2") galvanized weld wire fencing exteriorly supported by a wooden frame. The enclosure for each pair is essentially circular in shape with one side in common between the two units. There are keeper entry enclosures at opposite ends of the units which provide the only access to each enclosure. Keepers cannot go from one enclosure to the other without first exiting and walking around the units.

During the winter months heat lamps are provided which, in conjunction with a thermostat control, provide supplementary heat when the temperatures drop below 12.8°C. Each unit is additionally partially covered with army surplus parachuting and visqueen plastic to provide areas buffered from wind and rain.

A nest barrel is provided for each pair. This consists of a 60.96 cm (24") diameter by 91.44 cm (36") high oak (whiskey) barrel. Each barrel has a 15.24 cm (6") diameter entrance hole at about 15.24 cm (6") down from the

top of the barrel. A short branch is placed about 2.54 cm (1") down from the opening to serve as a perch. Access to the inside of the barrel for cleaning is provided through the top of the barrel which is inaccessible when in place and in use. A small 15.24 cm (6") door is also located to the rear of the barrel opposite the entrance opening and at bedding level so that the inside of the nest can be viewed when the nest is in use. Each barrel has a 2.54 cm x 1.27 cm weld wire ramp attached to the inside wall of the barrel just below the entrance opening that extends to the bottom of the barrel. This allows the birds to climb out of the barrel with ease and/or sit inside the edge looking out. The nesting material provided consists of a mixture of dry pine shavings with hay or chipped branches. The bedding is placed in the barrel so as to fill about three quarters of the barrel. The barrels are then hung in the cages beneath a sheltered area preventing excessive exposure to rain, sun and other elements. The bottom of the barrels are drilled through with 2.54 cm holes to provide drainage in case of excessive moisture build-up inside the barrels. This also provides for positive airflow through the bedding. A word of caution should be mentioned in that these holes can provide an area of hazard for the chicks if the parents excavate the bedding to the bottom.

Each of our enclosures include feeding stations in three locations. A center pole-mounted unit and two side-wall platforms give the birds access to food and water at all times. These multiple feed and water stations tend to eliminate most problems associated with dominance behavior encountered between the sexes. In particular with eclectus, the females appear to exert considerable stress on the males even in pair bonded situations at least based on our personal observations with this group. The diet provided during the course of time included within this paper consists of a seed and fruit mix which is described in Table 1. This diet is provided to the birds two times a day with an increase to three times per day when the females are incubating eggs and feeding young. The diet is also increased by 50% when the temperature drops below 10°C. Daily alterations in the diet are made to avoid excessive waste however there is always a small amount of waste allowed (i.e., there is always some diet left over in the bowls as well as that dropped to the ground). This allows the birds to have food available

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to them at all times thus keeping them from having to go to the ground to feed and probably picking up unwanted contaminants. This practice also takes into account the fact the birds may shift their feeding pattern throughout the day in response to a variety of environmental as well as behavioral factors. When chicks are in the nest the only other change in the diet has been the addition of softened whole Purina New World Monkey Chow biscuits.

Adult Birds

The following remarks are intended to summarize the overall experience we have had with these two pairs of eclectus between 1981 and September, 1984. As mentioned previously, the pairing of these birds was primarily based on size and to date the authors feel extremely comfortable with this as there have been no compatibility problems beyond those described below. The one pair known to us as the North pair has always shown a greater degree of compatibility as they are almost always seen perched next to each other and feeding behavior between them has been observed outside of the nest. Even in quarantine this pair appeared to demonstrate compatibility as the female and the male would perch as close to each other as possible given their separation by the weld wire.

Introduction to each other took place when both pairs were moved outdoors to their current enclosures. At this time the North pair showed no evidence of compatibility problems while the pair known to us as the South pair in the adjoining enclosure exhibited definite dominance behavior problems. The female would not allow the male to perch next to her and both could be seen lunging as if trying to bite each other. This behavior was seen more frequently from the female when the male was in close proximity to her. This behavior led to our having to place two heat lamp fixtures within the enclosure during the winter months as the South female always sat alone under the one lamp. The North pair, however, has always used the single heat source and has never expressed signs of needing another lamp although observations are continuous.

With regards to nesting, the North pair nested and produced young within the first nine months after being placed in their enclosure. The female of this pair, in fact, used a wire nest box that we had installed in her quarantine unit although she never remained in it for long but was often seen perching on its edge. This female has had a "devo-

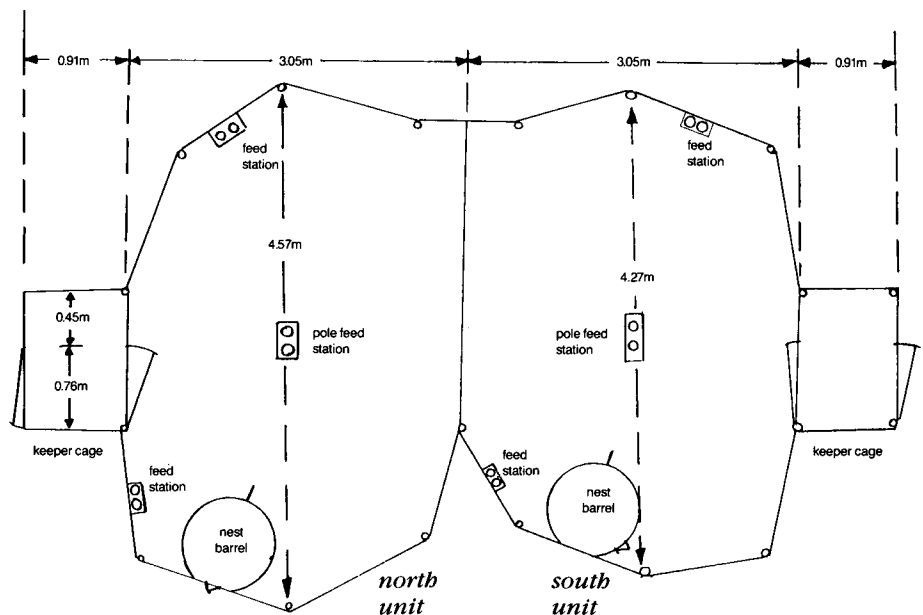
tion" to staying in the nest barrel since the day she was introduced into the enclosure. Even when young or eggs are not present, this female will stay in the nest barrel and has to be lifted out of the barrel prior to removing the barrel for cleaning. The first nesting for this pair occurred only after they excavated the bedding down to the bottom of the barrel. Whether this was a cooperative or individual effort we cannot say as we have never seen the animals doing this. It should be noted that this behavior has since diminished and this pair rarely excavates the bedding now. This behavior has not been as significant for the South pair although it did occur at a very reduced level and has similarly been reduced over time. This difference in behavior between the pairs has been very noticeable over time and continues to be evident. The North pair has been more calm and more compatible and more tractable to handling attempts during nesting and other manipulations. There seems to be a greater degree of "trust" between the two in this pair.

Interestingly, this relationship between the North pair has, in our opinion, "induced" in the South pair a level of compatibility which has allowed them to reproduce and raise young successfully. This was noted in particular during the period in which the North pair was first nesting and the North male was feeding the female. The South pair reacted quite positively

to this behavior especially when the North young emerged from the barrel and were dependent on the adults for their food. The South female began to "beg" through the wire from the North male which appears to have led to male/male, female/female and male/female interactions across the wire barrier between the units. This behavior included aggressive activities between the two pairs which were noted in the appearance of cuts on the feet of the South male. This led us to modify the barrier by adding a finer mesh material which prevented physical contact with each other but still allowed visual as well as vocal contact.

The aggressive behavior noted above began to diminish following this modification and the behavior between the South pair began to improve as they were seen perching closer to each other more often and both individuals became less flighty. It should be noted that it is the dependency of the female on the male that appears to be critical in at least these two pairs of eclectus. The male must gain the female's trust so that she will not attack him while he is in close quarters with her in the nest barrel. At this time she is highly dependant upon him to feed her during the incubation period. Once the young hatch, the male must also be able to bypass the female so that he can assist with feeding the chicks. We have observed the male feeding the young on the day of hatching. His role in

Eclectus Breeding Units



Total height of the units is 2.44m at the unit center and 2.13m on the perimeter including the keeper cages. Substrate is sandy soil.

feeding the young remains predominant throughout the rearing process. It is this strong bond in one pair and perhaps tenuous yet reinforced bond in the other pair that has been, in all likelihood, responsible for our success in the production of eclectic young.

Incubation

Incubation of the eggs is done by the female and the only noticeable difference in activity in the unit is the fact that the female is rarely seen out of the nest during this time. Although no detailed observations have been recorded, her appearances out of the barrel are more towards the end of the incubation period and this we will note is only based on two sightings over the fourteen day combined nesting of both pairs. The start of incubation may also be noticeable by the male feeding and then flying over to the nest barrel.

Periodic observations of the female in the nest have shown us that the female does not sit on the eggs continuously and this is probably based on the ambient temperature to some degree. On hotter days or at hotter times of the day the female moves the eggs, thus regulating their temperature. During the summer months she appears to be off the eggs for fairly long periods of time although this is based solely on observation and is not quantified in any way. This observation may, however, be significant in the overall decision making process when managing any incubating species. It encourages one to be cautious on deciding whether the female is or is not incubating and when the incubation period actually started. Table 2 lists the various clutches to be discussed further in this paper; however, it should be noted here that the number of eggs laid is generally one or two and there may be a variation from clutch to clutch although, in our case, there appears to be some consistency within each pair.

Chicks

Our observations of both the chicks and incubating females as well as the weighing of the chicks took place as follows. The nest barrels were adapted prior to installation with a rear working door as discussed previously. This was the only access used by staff during data collecting although occasional glancing observations were made through the main entrance to the barrel used by the adult birds. It was through these rear openings that the adults were acclimatized to both observation and manipulation. Anytime we approached the units or barrels we always made the birds aware of our presence

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by speaking or making other sounds which were not sharp or sudden in nature. During the early stages the intervals between uses of this rear door and observations were sporadic which then were converted to a predictable pattern as we learned of the birds' acceptance of our procedures. During this early period we concentrated on the North pair of birds as they seemed to be accepting our presence more readily.

At first when we used this rear door we only observed the activity within the barrel and as time progressed we began to occasionally place a hand into the nest itself which allowed the birds to acclimate to our presence and allowed us to see their reactions. As the birds reacted positively to this activity we rapidly progressed to a stage where we were able to remove older chicks from the nest to record weights and then replace them in the nest. This procedure worked well for the North pair and was not attempted with the South pair until late in our study as this pair reacted fairly violently in the nest to our presence. The female would vocalize loudly with the male joining in if he was present in the barrel. Both birds would flap their wings, lunge at us and generally react aggressively to our intrusion.

Chicks were weighed at various times throughout the nest period; however, no continuous day-to-day weighing was attempted during this period because we did not feel that we had reached a stage of acclimatization which would allow for this. We should note that based on the work done to date we are certain that such a stage could be reached whereby chicks could be weighed daily and possibly more often. We were even able to remove the adult female from the nest once for weighing while she was rearing young in the nest. The adult male rarely remained in the nest so we were not able to weigh him during this period.

The South pair never reached a point where we felt comfortable working with the young. Following a long acclimatization we were capable of working with them more frequently towards the middle of 1984. In the case of the South pair our procedure was modified to include our darkening the inside of the barrel by covering the nest entrance with a drape and then use another drape to enter the rear of the barrel. This procedure was modified again when we found that in the case of the South pair when we laid a drape

over the female we could slide our hand under the female and remove the chicks for weighing.

The chicks never appeared to show any ill effects from the handling and we have not lost any chicks due to this procedure. A noticeable fact that arose through this procedure was that each chick developed a different personality and that every time the procedure was employed one had to be ready for anything. In general, the female chicks would be more aggressive. When they were handled they tended to move about more and as they got older they vocalized and tried to lunge-bite us. The male chicks tended to remain passive and generally did not display any aggressive behavior. When the chicks are close to emerging from the barrel, although we never had a problem with this procedure, there is the real possibility of their emerging from the nest prematurely if they become unduly excited and try to flee.

Data Collected

Our first nesting occurred in January of 1982 with the first hatching occurring on February 20, 1982. The North pair laid two eggs per clutch and the South pair laid generally one egg per clutch although in 1984 they began laying two eggs per clutch. The North pair hatched both eggs consistently whereas the South pair hatched only one egg even if two eggs were laid. Incubation lasted an average of 28 days and hatching usually took place within 24 hours for both eggs. There is one instance when there was at least a delay of five days between hatching which may have been caused by a delay in laying time or other factors. We were able to document this in the fact that there was a great weight difference between the chicks as well as by observation of the nest for hatching. The chicks can be visually sexed by the color of the emerging feathers at between 2.5 and 4 weeks of age. The majority were sexed in the third and fourth week. Fledging usually occurred at 10 to 10.5 weeks with the juveniles beginning to feed on their own between 12 and 14 weeks of age.

The chicks have a rapid weight gain period during the first thirty days after hatching. Then they level off for the next thirty days. The leveling off period coincides with the time during which they are developing their feathers and losing their downy appearance. This weight gain may also help in providing them with a stored energy source for the period of time it takes to obtain food on their own after fledging. This

data has many management implications as well as from the standpoint of deciding when to remove the young from the nest or enclosure following fledging. We generally waited for the young to begin feeding on their own before removing them from the enclosure if they were totally parent raised. There were a number of instances when the young were pulled at about three weeks of age for hand raising. To date we have not lost any individuals out of this project and the limited follow up possible of hand reared individuals has not indicated any problems with these procedures. All hand rearing was done off-site at another facility and involved the sale of the birds at three weeks of age.

It is crucial to realize that although proper housing and nutrition are important considerations to a successful breeding management program it is equally important to provide the animals with a healthy "psychological" environment. This includes but is not limited to conditioning the animals to handling procedures that are consistent over time and that preclude as much as possible the shocking of the animals because you have to handle them due to a problem or other factors.

In other words, a conditioned animal is more likely to accept a stressful procedure that is necessary due to unforeseen illness or other, than an animal who is given extreme privacy because it is skittish, in which case the animal finds the same situation more stressful.

Conclusion

This paper presents one system of working with eclectus parrots that appears to have worked and offers some interesting possibilities for future work. There is no guarantee that what has worked for us will work well elsewhere. Note that the information discussed in this paper covers the authors' experience between March 1981 and September 1984.

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