

INTRODUCTIONS

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It has often been said that wild orangutans are enigmatic due to their perceived solitary nature and the fact that there still appears to be no easily recognizable social units. They are also unusual in many other ways. For instance, they exhibit an unusually high degree of sexual dimorphism, are the largest arboreal mammal, display an unusually high degree of forced copulation and sexually mature males appear to come in two distinct morphological types, each with its own mating strategy. New information has recently been published as a result of research in previously unstudied areas and by examining previously unstudied aspects of their behavioral ecology (see Behavioral Biology Chapter, this volume).

In captivity, male orangutans are frequently housed in permanent situations with one or more females, which increase the possibility of their coming into contact with various-aged immature animals. This chapter will provide information on introductions involving all age and sex classes of orangutans.

This chapter refers to the age classes as defined by Galdikas (1981). Animals are considered infants during their first four years of life, and juveniles from four to eight years of age. Females are classified as adolescents from nine to fifteen years of age and males from nine to twelve years of age. Males go through an additional stage termed "subadulthood" (when they are as large or larger than adult females and have not yet fully developed their secondary sexual characteristics) before reaching physical maturity at about eighteen years of age.

Information on orangutan introductions and case histories were obtained through surveys. Institutions that responded to the survey are listed at the end of this chapter.

Developing Introduction Plans

The first step in any introduction should be the development of an animal management plan. Plans need to be flexible and specific to the individual animals involved. APES profiles and other records containing information on the social history of the animals involved should be reviewed. Meetings held prior to the introduction should include discussions on alternative plans of action, potential facility

modifications, staff involvement and intervention equipment needed.

Location and Equipment

Facility design may limit the location for an introduction. It is important to conduct a facility review prior to the introduction to determine if any modifications are needed. A variety of locations can be used for an introduction including holding and exhibit enclosures. Single enclosures should be avoided.

Using as much enclosure space as possible is important when planning an introduction. Enclosures that have “dead ends” should be avoided. Animals should be provided with every opportunity to escape from each other. Restricted access cages (or “creeped cages”) should be used if your facility has them. Remember that adult orangutans can fit through a very small opening. It is highly advisable to test the animals ability to pass through a “creeped door” prior to the introduction. At Brookfield Zoo(Chicago Zoological Society), a fully flanged male weighing 350 pounds fit through a 5.5 inch creep door opening with little effort. When choosing an introduction location, consider staff accessibility to the animals in case intervention is necessary. Keep in mind, that unnecessary intervention can prolong or inhibit the introduction process.

All animals involved should be given ample time to become familiar with any new enclosure that will be used for the introduction. This is especially important if an introduction will occur in an area that contains potential hazards such as a dry or water-filled moat.

Special care should be taken when introducing one or more unflanged (subadult) males as this is a period of hormonal fluctuation (see Development, Reproduction and Birth Management Chapter, this volume). Groupings containing individuals of this developmental stage should be monitored closely for indications of increased aggression or submissiveness by any individual.

Infant introductions (which are uncommon) require a more controlled situation. They may need a longer adjustment period when being introduced to a new enclosure in order to become familiar with new surroundings prior to the introduction. Deep bedding and the use of a restricted access or “creep” door is highly recommended for this type of introduction. Infants should always have the choice to get away from the other animals it is being introduced to.

Good visual access and the ability to maximize control are important factors when planning an introduction. Animal control equipment that can be available during the introduction includes: water hoses, high-pressure hoses, carbon dioxide fire extinguishers and/or immobilization equipment. This type of equipment should be readily available BUT NOT VISIBLE TO THE ANIMALS. It is not uncommon for animals to be stressed when seeing this type of equipment.

Providing Bedding, Diet and Behavioral Enrichment During Introductions

The use of bedding is strongly encouraged during an introduction; it can help minimize fall-related injuries and provide foraging opportunities. At least 4 inches of hay, wood wool or other substrate should be used to ensure adequate padding of the enclosure floor. Deep bedding is critical when doing introductions involving infants.

Food items offered during an introduction should be plentiful enough to avoid competition between individuals. Small forage items can promote species typical behavior (i.e. foraging) while serving as a distraction.

Behavioral enrichment should be provided as well. Refer to the Behavioral Enrichment Chapter, this volume, for additional ideas. The use of browse is highly recommended.

Progression of the Introduction

Group composition including size, sex and age of the animals involved, animal personalities, A.P.E.S. (ape profile and evaluation system, see A.P.E.S. Chapter, this volume) and social history should all be evaluated. If the introduction is to occur in phases, the behavior of all animals involved during the prior phases of the introduction should be evaluated.

Auditory, visual and olfactory contact is the first step in an introduction. Mirrors can be used to facilitate this if the facility design doesn't allow this. Mirrors can be angle between individual enclosures.

Limited tactile contact may follow. Fine mesh screens or grates between adjacent enclosures can be used. These can replace solid doors or be added to enclosure barriers that would otherwise allow full tactile contact. Staff may be able to better evaluate how individuals may react when in full contact. Consideration should be given to the possibility of animals biting each when this type of contact is allowed.

If your facility has the ability to increase tactile contact opportunities, this should be the next step. During this phase, carefully monitor all individual animal responses to their new peers. Any aggressive behavior should be evaluated prior to the full-contact phase of the introduction. Affiliative behavior can be considered positive and reinforced by caregivers where appropriate.

Full contact is the final phase of the introduction process. The animals must be allowed sufficient time to integrate into their new social group. The adjustment period to a new social situation may be quick or could take an extended period of time. It is important to let the behavior of the animals involved dictate the pace of the adjustment period.

Orangutan introductions are highly variable. Aggression during introductions may occur and is not unusual. Some behaviors commonly seen during introductions include: chasing, hair pulling, slapping, wrestling, and biting of toes and fingers, and ano-genital inspection. It is common to see sexual behavior and forced copulations when introducing an adult pair. Careful observations are necessary to identify encounters that could escalate and result in serious injury. Unnecessary separations should be avoided as frequent separations and subsequent reintroductions can be a factor in increasing aggression between individuals. Animals should be allowed the time and opportunity necessary to work out any differences to be compatible. Emphasis should be placed on positive interactions between individuals before moving on to the next introduction phase (if the introduction is planned to occur in stages). When doing any introduction, it is important for staff involved in the process to discuss how each person involved perceived how the animals interacted. This will help in planning the next step of your introduction. **Staff monitoring and assessment is critical throughout the entire introductory process.**

In cases where there is a high degree of uncertainty regarding potential aggression, some institutions have used diazepam during the initial introductory phases. In general, results have been successful. The use of drugs should be carefully considered by your staff veterinarians.

Separation at Night

Depending on your animal management routine, you may want or need to separate individuals at certain times. Some individuals do not tolerate being housed together continually. Continual housing or restricted access housing (creep method) should be considered for a breeding pair to allow unrestricted access during the ovulation period.

Case Histories

Each case history gives an overview of an orangutan introduction done at an SSP© Institution.

Introductions Involving Infants (0-48 months of age)

Unweaned infant reintroduced to mother
Infant reintroduced to mother
Infant reintroduced to mother than to sire
Unweaned infant to surrogate mother
Unweaned infant to surrogate mother
Unweaned infant to surrogate mother than to natal group
Unweaned infant to surrogate mother and juvenile male
Unweaned infant to surrogate mother and infant female
Infant and surrogate mother to adult male
Infant and surrogate mother to adult male
Infant and surrogate mother to adult male
Two infants to surrogate mother then to 3 adult females
Two infants to mixed adult/juvenile group
Three infants to mixed adult group
Infant and mother to unrelated adult male

Unweaned infant reintroduced to mother

An attempt was made to reintroduce an unweaned female infant to her mother. After birth, the dam did not allow the infant to nurse. The infant was removed at 48 hours post partum for feeding by caregivers and immediately put back with the mother. The dam still prevented nursing from occurring. The following six weeks (during the hand-rearing period), the infant was shown to the dam and placed on the dam's nipple via an introduction door. The infant successfully nursed via this method. At six weeks of age, a full contact introduction was done. Staff observed the dam to throw the infant. Although the infant was not injured, the introduction was discontinued. Staff felt that the 6 week period of hand-rearing and nursing training broke the maternal bond and confused the dam.

Institution: Houston Zoo

Location: 3 to 4 indoor holding cages

Time Frame: 4 to 6 weeks

Results: unsuccessful (although successful nursing through cage mesh occurred)

Infant reintroduced to mother

A 14-year-old female was reintroduced to her 17-month-old male infant. Several months of visual and auditory contact were followed by tactile contact. Play behavior and food sharing through the wire

were observed. Forty five minutes into the full contact introduction, there was complete ventral-ventral contact and the two remained together. At five years of age, the male was seen on the nipple during stressful situations.

Institution: Fort Worth Zoo

Location: indoor exhibit with one small off exhibit holding area

Time Frame: 1 day

Results: successful

Infant reintroduced to mother, then sire

A 5-month-old, hand-reared infant female was reintroduced to her 28-year-old mother. The adult female picked the infant up and held her. Some resistance was observed from the infant who whimpered and occasionally slapped at her mother. By the early afternoon both animals had settled down.

When the infant was seven months old she and her mother were introduced to the 28-year-old sire. The male threw the infant across the enclosure and the infant landed in a pile of hay. The infant was not injured but appeared stunned and upset. The introduction was ended.

At 10 months of age, the infant and her mother were again introduced to the sire. The infant clung to her mother. The introduction was successful and the three remained together. This case is the earliest known age an infant being reintroduced to her own mother.

Institution: Brookfield Zoo

Location: off exhibit holding area

Time Frame (to mother): 1 day

Results: successful

Time Frame (to sire): First attempt - 2 months after introduction to mother. Second attempt – 5 months after introduction to mother

Results: 1st attempt unsuccessful

2nd attempt successful

Unweaned infant to surrogate mother

A 9-month-old, hand-reared male infant was introduced to a 23-year-old surrogate mother. He had been trained to come to the door of his holding cage for solid food and to drink from a cup. After the introduction the surrogate would bring him to the door for feeding by caregivers.

The surrogate had recently given birth to an infant that did not survive and was still lactating. Within two weeks the infant began

nursing from the surrogate. His formula was discontinued although feeding of solid food by caregivers continued. This surrogate had abandoned her first offspring and had no prior infant care experience.

Institution: Topeka Zoo

Location: holding area

Time frame: less than one week

Results: successful

Unweaned infant to surrogate mother

A 14-month-old hand-reared infant was introduced to a 33-year-old adult female. Although the female had given birth 4 times at another institution, she failed to raise any of her offspring. She had been housed successfully with other juvenile and adolescent orangutans in the past. The first phase of the introduction, involved putting a mesh door between the infant and surrogate for 3 days. The door had many small holes drilled in it which would allow very limited tactile access. In the next phase, a door with removable bars was put between the cages of the infant and surrogate. This door allowed more tactile contact between the two. The surrogate was seen pushing her blanket through the bars towards the infant on the first day. Two weeks later, a bar was removed from the restricted access door. This would allow the infant to enter the female's cage if he chose to do so. The door remained in place for the next two weeks. On day 15, the infant transferred to the surrogate's cage. Staff was unsure if he went over by himself or if he was pulled over by the surrogate while he was resting on his blanket. Two days later, he was sleeping with the surrogate.

Institution: Brookfield Zoo

Location: off exhibit holding cages

Time Frame: 27 days

Results: Successful

Unweaned infant to surrogate mother then to natal group

A 6-month-old female was introduced to a 21-year-old surrogate. The surrogate had been hand-reared and had previously given birth to twins. She had exhibited considerable maternal behavior towards the twins as well as other hand-reared infants that had been introduced to her group in the past.

Because the infant was not weaned and the surrogate mother did not appear to be lactating, the staff began a positive reinforcement training program prior to and continuing after the introduction. The infant was trained to drink from a bottle through the front of the

enclosure. The adult female was trained to bring the infant to the enclosure front for hand feeding by caregivers.

On the day of the introduction the infant and female were given access to one another, eventually being closed into the same cage. The infant's natal group consisting of the sire and dam, one juvenile male and two juvenile females had full visual access to the introduction.

The infant cried constantly for the first three hours. She later calmed down but was heard screaming sporadically. The surrogate female did not approach the infant but remained quiet. The two remained together and the primate staff undertook a twenty-four hour watch for the first week. Closed-circuit video equipment was used to lessen the disturbance to the orangutans. As each day progressed the infant became more comfortable with the surrogate.

During the first two weeks in the holding area no physical contact was observed. When access to the outdoor exhibit was provided the infant clung to the surrogate continually.

Other members of the natal group were gradually introduced to the surrogate and infant in the outdoor exhibit. The animals were introduced in the following order over a three-hour period:

- a. a 30-year-old adult male (the sire) that monitored interactions between the females and prevented aggressive interaction in the group
- b. a 29-year-old dominant female (the dam)
- c. three juveniles

Institution: Audubon Zoo

Location (to surrogate): one holding cage during introduction to surrogate mother

Time frame (to surrogate): one day

Results: successful

Location (to natal group): outdoor exhibit

Time frame (natal group): began six weeks after introduction to surrogate, completed in one day

Results: successful

Unweaned infant to surrogate mother and juvenile male

A 2-day-old male infant who was rejected by his mother was brought from another institution (Lincoln Park Zoo) to see if a maternally competent, lactating female would adopt the newborn. This female had a 4-year-old juvenile son. The infant was placed in a heavily bedded cage and on a blanket in the cage. The female showed interest initially by carefully examining and at times briefly touching

the infant. The juvenile male also appeared interested in the infant, however when he tried to move closer to the blanket where the infant was laying. His mother would restrain him from going too close to the infant, by holding onto his leg. After about one hour, the infant was removed from the enclosure when the female failed to show any significant interest.

NOTE: A second introduction attempt for this male infant was attempted later that day with another lactating female at the same institution. See next introduction description for details.

Institution: Brookfield Zoo
Location: off exhibit holding cages
Time Frame: less than 1 day
Results: Unsuccessful

Unweaned infant to surrogate mother and infant female

NOTE: This introduction describes the continued introduction attempt for the two-day-old male in the prior case history.

A two-day-old male infant who was rejected by his mother was brought from another institution (Lincoln Park Zoo) to see if a maternally competent, lactating female would adopt the newborn. This female had a 2-year-old daughter who was regularly consuming solid foods. This prospective surrogate female had undergone a maternal skills training program in the past. The infant was placed in a heavily bedded cage. Initially, some minor interest was shown by the adult female towards the infant. Zoo staff decided to attempt a training session with the adult female. Using behaviors taught to the adult female (during maternal skills training) an attempt was made to get her to pick up the infant. Although, she picked up the infant, she did not carry him properly and ended up putting him down after a few minutes. The introduction was ended and the infant returned to his birth institution.

Institution; Brookfield Zoo
Location: off exhibit holding cages
Time Frame: less than 1 day
Results: Unsuccessful

Infant and surrogate mother to adult male

An adult female and her adopted 2-year-old infant were introduced to an adult male. The adults had previously lived together. During several introduction attempts both adults received bite wounds. Most wounds were inflicted by the male to the female. The female strongly resisted attempts at forced copulation by the male. Both the adult animals were periodically observed sharing Gatorade® with one another. The male was not aggressive towards the infant and was

observed soliciting play. The introductions were discontinued when the female began placing and holding the infant between herself and the male.

Institution: Houston Zoo
Location: indoor holding area
Time Frame: 8 weeks
Results: unsuccessful

Infant and surrogate mother to adult male

A 3-year-old female infant and her 29-year-old surrogate mother were introduced to the infant's 17-year-old sire. The infant had previously been housed with her sire for two years. The sire and the surrogate mother had also been housed together during the hand-rearing period of the infant. All three had auditory and visual access to one another via their holding cages in the night house. The animals were allowed (in order) auditory, visual then tactile contact. A creep door was available for the infant. The infant did not use the creep, but preferred to stay in the same cage with the adults.

During the introduction, the adult male made repeated attempts at forcible copulation with the adult female, which she strongly resisted. The introduction was stopped after the female placed the infant between herself and the adult male. Staff felt that the adult female knew the male would not interact aggressively with her when she was holding the infant. The adult male and female were housed together routinely prior to her adoption of the infant. During this time, the adult female exhibited aggression towards the male on a daily basis. When this introduction began, the male was developing cheek pads and had gained in weight, size and strength.

Even while being intermittently aggressive to the adult female, the adult male only exhibited affiliative behavior towards his infant. He was observed extending his arm upwards to solicit the infant and vice versa. The infant remained arboreal during the introductions, at times hanging directly over him. At times, the adult male would kiss squeak at the infant. Occasionally, he would lie down very still on his back to solicit the infant's attention as she approached very closely. Both the infant and male were seen extending enrichment devices toward one another to encourage play. The adult female would display to intervene and break-up their attempts to interact, sparking aggression from the adult male.

Institution: Houston Zoo
Location: 4 to 6 holding cages
Time Frame: the animals were never full integrated
Results: Mixed – successful to infant, unsuccessful to adult female

Infant and surrogate mother to adult male

A 19-month-old infant and his 33-year-old surrogate mother were introduced to an unrelated 18-year-old adult male. For three days prior to the full contact introduction, a mesh creep door was put in between the cages of the adult male and the surrogate mother and infant. On the day of the full contact introduction, the infant was separated from the surrogate mother and the adult male for the first half hour. No negative interactions were seen between the adult male and the infant. Minor aggression was seen by the adult male towards the surrogate mother during copulation attempts. After two successful copulations, the adult male was seen gently grooming the surrogate mother. A restricted access door was put in overnight to allow the infant to leave the adults cages if he chose to do so. After 2.5 months of the three animals appearing to be compatible, the adult male was observed handling the infant in a rough, aggressive manner. The male was then separated from the infant and surrogate.

Institution: Brookfield Zoo

Location: off exhibit holding cages

Time Frame: 2.5 months

Results: Mixed but overall unsuccessful

Two infants to surrogate mother; then to three adult females

An 18-month-old female and a 15-month-old male were hand-reared together and subsequently introduced to a 28-year-old surrogate mother. This female was chosen because of her history as a surrogate mother at Yerkes Regional Primate Research Center. Although she never approached either of them, the infants both appeared afraid and stayed away from her. No aggression was observed.

The second phase of the introduction occurred six months later. The surrogate mother and both infants were introduced one at a time to three different females over a two week period. They were first introduced to the 17-year-old female. The surrogate mother chased her for approximately 1.5 hours. During the second phase, the 20-year-old and 21-year-old females were added. In the third phase all the animals had full contact. All got along fine for several weeks, but eventually the 20-year-old began challenging the dominance of the surrogate mother. The decision was made to remove the 20-year-old from the group because of her aggressive nature.

Institution: Topeka Zoo

Location: one small holding room during introduction to surrogate mother

Time frame (surrogate): less than one week

Results: successful

Time frame (females) several weeks
Results: mixed

Two infants to mixed group of adults and juveniles

Two female infants were introduced to two males, 28 and 5 years old. One of the infants was born and hand-reared at Audubon Zoo. The other infant was hand reared at the Gladys Porter Zoo then sent to Audubon at 6 months of age. Both infants were raised together until weaning, which occurred at 16 and 19 months old respectively. The infants were introduced to the other animals in the following order:

- a. The 27-year-old female was introduced first. The infants were housed in one cage and given access to her through a creep door. Only the infants had the choice to move freely between the enclosures. This allowed the infants to interact with the adult female at their own pace.
- b. The 28-year-old male was introduced next. He was housed with the 27-year-old female and again the infants were allowed creep access to the adults. The adult female exhibited no maternal behavior but would initiate play and contact. The male had shown great tolerance with infants in past introductions. He had acted as a mediator between the adult females when the older dominant female exhibited any aggression toward the younger female. His presence was felt to be important before the adult females were introduced.
- c. The 20-year-old female with her three adopted, hand-reared juveniles were introduced last. This subgroup was introduced at the same time because the female would become distressed when separated from the juveniles. The juveniles pulled and dragged the infants around, although no aggression was observed.

Institution: Audubon Zoo

Location: 27-year-old female & 20-year-old male - two off-exhibit holding cages. Entire group – outdoor exhibit

Time Frame: 11 – 15 weeks

Results: successful

Three infants to mixed group of adults

A 13-month-old male and 18-month-old identical twin females were hand-reared together. Once weaned, the infants were reintroduced to their natal group which consisted of the 24-year-old sire and the infants' mothers.

The infants were introduced first to the male infant's 24-year-old mother. The 16-year-old mother of the twins was introduced next.

The adult male was introduced last. The introduction went smoothly. Minor aggression between the adult females occurred over accessibility to the infants. The older female played roughly with the infants. The younger hand-reared female was gentler and waited for the infants to approach her. The infants preferred this female. The adult male was observed playing with the infants as well.

Institution: Audubon Zoo

Location: two off-exhibit holding cages during introduction to adult females; an outdoor exhibit during introduction to adult male.

Time frame: 11 to 15 weeks

Results: successful

Infant and mother to unrelated adult male

A 14-year-old female and her 3-year-old male infant were introduced to an unrelated 30-year-old male. The adult male had not been housed with another orangutan for over 10 years (while at another institution). The female was considered to be very experienced with and comfortable with adult males. Upon introduction, the male began forcibly copulating with the female. The infant held on to his mother during the copulation and repeatedly tried to bite and lunge at the adult male. Although after a few days, the animals appeared comfortable with each other, the adult male continued to exhibit forcible sexual behavior towards the female. The female and her infant were separated after approximately one month due to his continual copulation attempts with the female

Institution: Brookfield Zoo

Location: off exhibit holding cages

Time Frame: approximately one month

Results: mixed – successful with infant, unsuccessful with adult females

Introductions Involving Juveniles (4-8 years old)

Juvenile male to juvenile female

Juvenile male (hand-reared) to twin juvenile females (hand-reared)

Juvenile male to adolescent female

Juvenile male to two adolescent females

Juvenile male to adult female

Juvenile male to adult female and her female infant

Juvenile male to two adult females

Juvenile male to adult pair

Juvenile male to mixed group

Juvenile female to juvenile male and adult female

Juvenile female to mixed group

Juvenile female and male to adult female

Juvenile male and mother introduced to subadult male

Two juveniles and their mothers to mixed group
Juvenile female to adolescent male
Juvenile male and surrogate mother to adolescent male
Juvenile pair to juvenile pair

Juvenile male to juvenile female

A pair of 7-year-old orangutans (both from different facilities) were introduced at the Philadelphia Zoo to be housed in their new orangutan exhibit. The animals were first given auditory contact for one week. This was followed by 5 days of visual and tactile contact (done with a howdy panel). Full contact was next and the introduction went without problems

Institution: The Philadelphia Zoo
Location: off exhibit holding cages
Time Frame: 12 days
Results: successful

Juvenile male (hand-reared) to twin juvenile (hand-reared) females

A 4-year-old male was sent to the Cincinnati Zoo and Botanical Garden to be introduced to identical 5-year-old twin females. All three of the animals were hand-reared at other institutions. In order to become familiar with the enclosure, the male was allowed access to the exhibit for a few days prior to the introduction. The twin females were introduced to the male one at a time. Within hours of the first introduction the male and female were observed play wrestling. The second twin female was introduced a day later with no problems.

Institution: Cincinnati Zoo and Botanical Garden
Location: indoor exhibit
Time Frame: less than one week
Results: successful

Juvenile male to adolescent female

A 9-year-old female and 5-year-old male were given tactile access to one another via a mesh screen for 3 months prior to their full-contact introduction. When the mesh screen was removed, rough play and biting were observed. The female was observed to hold the male down. He sustained minor bite wounds to the hands, arms and head. After two hours, they were separated when the female was observed holding the male down. The animals were successfully integrated after their contact time was gradually increased over a 12 week period.

Institution: Houston Zoo
Location: indoor exhibit
Time Frame: 12 weeks
Results: successful

Juvenile male to 2 adolescent females

A 7-year-old male was introduced to two females, ages 7 and 10. This introduction took a total of 3 weeks. The animals had auditory contact from the beginning of the introduction. One week of visual contact was next followed by a week of tactile contact. Some minor scrapes occurred during the introduction. No sexual behavior was seen however the animals engaged in frequent play behavior and wrestling. The male is routinely separated from the two females overnight.

Institution: El Paso Zoo
Location: holding area dens
Time Frame: 1 to 3 weeks
Results: successful

Juvenile male to adult female

A 7-year-old male was introduced to a 19-year-old female. The animals first had 3 to 4 weeks of auditory and visual contact. The second phase consisted of 3 weeks of tactile contact. Although the introduction was successful, there were some injuries. The female would get angry, especially over food and there were several incidents resulting in wounds to the male's hands and feet. Staff observed very little sexual behavior. At 7 to 10 weeks, the animals were left together during the day unattended. They were separated at night due to the female's greediness over food. Once the male grew in size (after approximately one year), they were housed together overnight.

Institution: Rolling Hills Zoo
Location: dayroom, night holding cages and patio
Time frame: 7 to 10 weeks
Results: successful

Juvenile male to an adult female and female juvenile

A 6-year-old male juvenile was introduced to a 33-year-old female and her 4-year-old juvenile daughter. The first phase of the introduction involved 4 days of visual, auditory and olfactory contact. The second phase was supposed to involve limited tactile contact through a creep door. When the animals were allowed access to the creep, the adult female pulled the juvenile male through the creep. The group was housed together for a few hours each day for 2 weeks. Over the next week, they were housed together during the day but

separated at night. The final phase of the introduction allowed continual housing for this group. No serious injuries occurred but some of the animals had scratches.

Institution: Cheyenne Mountain Zoo
Location: indoor exhibits with a circular rotation pattern
Time frame: less than one month
Results: successful

Juvenile male to two adult females

A six-year-old juvenile male was introduced to two adult females ages 13 and 20. Auditory and visual contact occurred in the first introduction phase. Tactile contact followed but was permitted only while staff observed the animals. In less than one week, the male and the 20-year-old female were compatible. After 4 to 6 weeks, all animals were successfully integrated. No fights occurred during this introduction and the animals are housed together continually.

Institution: Henry Doorly Zoo
Location: one outdoor exhibit, two indoor exhibits and 4 holding cages
Time Frame: 4 to 6 weeks
Results: successful

Juvenile male to adult pair

An unrelated 4-year-old male was introduced to a 25-year-old female. The female appeared curious but did not initiate contact with the male. After 2 days they were housed together overnight. Three days later a 25-year-old male was introduced. Although no aggressive behavior was observed, the young male stayed close to the female. Two days later they were housed together continually.

Institution: Cheyenne Mountain Zoo
Location: indoor exhibit
Time Frame: 1 day - (female); 2 days - (male)
Results: successful

Juvenile male to mixed group

A 5-year old male was introduced to a subgroup consisting of an 11-year-old male and a 7-year-old female. Later that same day, two males were introduced, 7 and 13 years of age. The 5-year-old male had been housed at different times in the past with the other animals with the exception of the 13-year-old male. The 13-year-old pursued the 5-year-old male, pinned him down while biting or inspecting his genitals and attempted to copulate with him. The 5-year old attempted to avoid him.

The 5-year old was housed with the female overnight. The next day the 11-year-old was allowed access to the 5-year-old male and the female. Two hours later all animals were together again. The 13-year-old male bit the fingers and toes of the 5-year-old. Later in the day the 5-year-old was observed play-wrestling with the 6-year-old male. All animals were left together overnight.

Institution: Brookfield Zoo
Location: four off-exhibit holding cages
Time frame: less than one week
Results: successful

Juvenile female to juvenile male and adult female

A 7-year-old female was introduced to an 8-year-old male and an adult female 20 years of age. Auditory contact was the first introductory phase followed by visual and tactile contact. The juvenile female was hand-reared, had been used in animal shows and had never been housed with another orangutan. She was first introduced to the male due to his gentle nature. Staff also felt due to her past social situation, she needed to learn some social skills prior to being introduced to the adult female. The adult female had a history of aggression towards unrelated females. At first, the females were compatible. After 3 to 4 months, the adult female became extremely aggressive to the juvenile female. Aggression began when the juvenile female had her first menstrual cycle. The adult female became increasingly aggressive and inflicted frequent lacerations to the juvenile female's feet, hands, legs and arms. The aggressive episodes increased in frequency, duration and severity over time. Eventually, the introduction was stopped due to the increasing stress levels of the juvenile female. The juvenile female and male never had any problems and were compatible. The juvenile female was eventually sent to another institution.

Institution: Rolling Hills Zoo
Location: dayroom, night holding cages and patio
Time frame: over 21 weeks
Results: unsuccessful

Juvenile female to mixed group

A 7-year-old female was introduced to a 27-year-old female, a 32-year-old female, a 6-year-old male and a 27-year-old male in stages. First, the 7-year-old female was introduced to the 6-year-old male. The 32-year-old female was introduced next. The third animal to be introduced was the 27-year-old male who has a very mellow personality. Finally the more aggressive 27-year-old female was introduced without incident.

Institution: Sacramento Zoo
Location: off exhibit holding areas
Time frame: three weeks
Results: successful

Juvenile female and male to adult female

A 32-year-old female, a 4-year-old hand-reared female and a 6-year-old male were introduced over a two year period.

Limited tactile contact preceded full contact introductions. The following events outline the introduction attempts.

- a. The adult female and the 4-year-old female were introduced in a large indoor enclosure. The introduction was uneventful until the fifth day when the adult female bit the young female on the hand.
- b. Eight months later the two females were reintroduced in the presence of an adult male (who has since died). On the fifth day the adult female again bit the young female on the hand.
- c. Five months later the young female (now 5 years old) was introduced to the 6-year-old male. Initially there was some full contact aggression but the animals calmed down.
- d. Five months later the adult female was introduced. Over a 6 day period the adult female bit both juveniles so the introductions were discontinued. A month later the adult female gave birth.

Institution: The Calgary Zoo
Location: indoor and outdoor exhibits; multiple holding enclosures
Time Frame: approximately two years
Results: unsuccessful

Juvenile male and mother to subadult male

A 4-year-old juvenile male and his mother was introduced to an unrelated subadult male. The sire of the juvenile male was recently shipped to another institution. The first step of the introduction was to put a creep door between the subadult male and the female and her juvenile. After 9 days, the males were observed playing together. The subadult male was observed carrying the juvenile on his abdomen for a few minutes.

Institution: Brookfield Zoo
Location: off exhibit holding cages
Time Frame: 9 days
Results: successful

Mother and juvenile offspring introduced to mixed group

A 31-year-old female and her 4-year-old female offspring were introduced to an 18-year-old male, a 34-year-old female and her 7-year-old male offspring. The 31-year-old and her daughter were given access to the exhibit prior to the introduction. All of the animals were introduced simultaneously in the outdoor exhibit. The adult male displayed but no aggression was observed. The animals were housed separately at night. On the third day the 31-year-old female bit the 34-year-old female. After 11 days the adult male was housed with the 31-year-old female and her offspring overnight. Copulations between the adult pair were observed. As of day 13 all the animals remained together overnight were separated for feeding.

Some slapping was observed between the adult females, and the 31-year-old became dominant over the 34-year-old female. After a few months the adult male was observed jumping on the 7-year-old male and chasing him around the exhibit. The juvenile sustained a minor bite wound to the foot. Due to the intensity of the interaction the group was split into two. The 34-year-old female and her offspring were separated from the adult male and the 31-year-old female and her offspring. A reintroduction may be attempted in the future.

Institution: Little Rock Zoo

Location: outdoor exhibit

Time Frame: 3 months

Results: mixed

Juvenile female to adolescent male

A 7-year-old juvenile female was separated from her natal group for social housing with a 9-year-old adolescent male. This male was recently removed from his social group due to aggression from an unrelated adult male he was being housed with. Over a 3 week period, the animals became acclimated to one another and the introduction was considered a success.

Institution: Brookfield Zoo

Location: off-exhibit holding cages

Time Frame: 3 weeks

Results: successful

Juvenile male and surrogate mother to juvenile female and adolescent male

A 4-year-old juvenile male and his 35-year-old surrogate mother were introduced to an unrelated 7-year-old juvenile female and an 9-year-old adolescent male. The 7 and 9-year-olds had been housed together successfully for 3 weeks prior to this introduction. The 7-year-old female had been creeped to the surrogate mother and her

son in the past for play sessions. It was thought the 7-year-old female would help promote positive social interactions among group members.

Initially, the 9-year-old male was aggressive towards the 7-year-old female and the 4-year-old male when they would play together. After a few days, the younger animals were comfortable with each other. After about one month, the 7-year-old female began to harass the surrogate mother (who had medical issues) as well as stealing her food. After 10 weeks, it was decided to remove the 7-year-old juvenile as it was very disruptive for the surrogate mother. The other animals continued to get along well.

Institution: Chicago Zoological Society (Brookfield Zoo)

Location: off exhibit holding cages

Time frame: 10 weeks for all 4 animals

12 weeks for surrogate mother and two males

Results: mixed for all 4 animals

successful for surrogate mother and two males

Juvenile pair to juvenile pair

A male and female, both 7 years of age, were introduced to a male and female, both 8 years of age. Both groups of animals were housed as pairs prior to the introduction. Initial contact was provided through a metal screen in an off-exhibit holding area. Prior to full contact each pair was allowed access to the other pair's cage. This allowed the animals to smell and touch the other pair's nest and feces. When the animals were given full access to one another some hair pulling and mock-biting was observed.

Institution: Topeka Zoo

Location: off-exhibit holding

Time frame: three weeks

Results: successful

Introductions Involving Adolescents, Subadults and Adults

Adolescent male reintroduced to adult male and juvenile female

Adolescent male to mixed group

Subadult male to two adolescent males

Subadult male to adolescent male and females

Subadult male to adult female

Subadult male to mixed group

Subadult and adult male to mixed group

Adult male to subadult male and three females

Adult male to adult female

Adult male to adult female

Adult male to adult female

Adult female to adult female
Adult female to mixed group

Adolescent male reintroduced to adult male and juvenile female

An adult male that was approximately 30-years-old was housed with his 11-year-old male and 6-year-old female offspring. The male suddenly attacked his son, inflicting bite wounds. Caregivers were unable to separate the animals during the 30 minute aggressive interaction. A reintroduction was attempted a few months later with the same results. This time caregivers were able to separate the two males. The 11-year-old male again sustained minor bite wounds and was permanently separated from his father.

Institution: Brookfield Zoo
Location: off-exhibit holding cages
Time frame: six months
Results: unsuccessful

Adolescent male to mixed group

A 10-year-old male was introduced to two adult females and their male offspring. The first female was 41 years old and her son was 3 years old. The other female was 34 years old and her son was 5 years old. The females only get along when they are in their exhibits and are separated from one another at night. The 10-year-old male had auditory contact with the other orangutans for 3 months prior to the introduction. The second phase of the introduction was one month of visual contact with the females and their offspring. The third phase involved one month of tactile contact through a mesh door. No injuries occurred during this introduction. The 10-year-old male and the 5-year-old male copulated once introduced.

Institution: Sedgwick County Zoo
Location: large indoor exhibit and 3 off exhibit dens
Time frame: 16 to 20 weeks
Results: successful

Subadult male to two adolescent males

A 16-year old male was introduced to two adult males, 11 and 12 years of age. The 16-year-old chased the younger males around the exhibit but no serious injuries were seen. The animals settled down within a few days resulting in a stable group that could be mixed together for several hours a day. The younger males were separated from the older male at night to alleviate stress.

Institution: Topeka Zoological Park
Location: indoor exhibit

Time frame: less than one week
Results: mixed

Subadult male to adolescent male and females

A 14-year-old male was introduced to three females ages 11, 13 and 36. The animals were introduced one at a time over a month period. During one of the introductions the male was observed pulling the hair of one of the females.

A week later the 14-year-old male was introduced to the 11-year-old male along with the three females. The males began to fight and the introductions were stopped after 45 minutes. A week later the 14-year-old male was introduced to the 11-year-old male and the 13 and 11-year-old females. The 36-year old female was separated due to mobility problems, age and size. Many incidents of aggression between the males were observed. The 14-year-old was the aggressor and the younger male sustained injuries to the hands, feet and lip. The introduction was stopped after three hours. The following day the same animals were introduced. The 11-year-old male sustained injuries requiring sutures. A fire extinguisher was used to distract the 14-year-old so the injured male could escape. No further introductions were attempted.

Institution: Little Rock Zoo
Location: four holding cages
Time frame: several months
Results: unsuccessful

Subadult male to adult female

A 15-year-old subadult male was introduced to a 38-year-old female. The introduction phases included (in order) visual, auditory, then tactile contact. No injuries occurred during this introduction. The female exhibited prosexual behavior towards the male although no copulations occurred.

Institution: Zoologico de Morelia
Location: indoor holding cages
Time frame: 1 to 3 weeks
Results: successful

Subadult male to mixed group

A 12-year-old male was introduced to a 27-year-old female, her 8-year-old female offspring, a 34-year-old and her 7-year-old male offspring. During the first phase of the introduction the animals had three weeks of visual and auditory contact followed by two weeks of tactile contact via a grate. All of the animals were then introduced simultaneously. The 12-year-old male copulated with both adult

females and was observed playing with the younger animals. The group was fully integrated after 11-15 weeks although the animals were routinely separated at night. Since the initial introduction the 7-year-old male died of gastric torsion apparently caused by the older male.

Institution: Sedgwick County Zoo

Location: indoor exhibit and all holding cages

Time frame: 11-15 weeks

Results: mixed

Subadult and adult male to mixed group

Two males, 16 and 21 years old were introduced to a 32-year-old female, her adopted 5-year-old son, 21 and 25-year-old females and a 24-year-old female and her adopted 1-year-old son. The animals were introduced simultaneously.

Prior to formation of this group several introductions had been done with all eight individuals in various combinations. While all of these animals had been together in different groups in the past, it had been several years since they were together. They had never all been together simultaneously. Due to the 21-year-old male's history of aggression towards certain individuals he was given diazepam for the first three days of the introduction. His aggression towards the subadult male and the oldest female lasted about an hour and was less intense than previously observed. Initially he interacted exclusively with the 16-year-old male, chasing him around the exhibit and inflicting minor bite wounds. The adult male displayed his dominance by chasing the subadult male before separation at night. These males were routinely separated from each other and from the group at night.

The older male attempted unsuccessfully to copulate with the oldest and most dominant female. After approximately one hour the other animals settled nervously in the trees, watching him as he lay on his back on the exhibit floor. By the fourth day his aggressive behavior, as well as the incidents of chasing other group members, had decreased and were less intense. Throughout the first few months of this introduction the 32-year-old female never appeared relaxed. She resisted the male's attempts to copulate and received minor bite wounds to her hands and back. She injured her arm when she fell from a tree while attempting to escape from the male. Though the injury was minor in nature their relationship did not improve. The decision was made to remove her and her adopted son from the group.

Institution: Topeka Zoo
Location: indoor exhibit
Time frame: several months
Results: mixed

Adult male to subadult male and three females

Three females, 10, 12 and 30-years-old were introduced to one another with no problems. Next, a 25-year-old adult male and a 13-year-old subadult male were introduced individually to each of the three females. Prior to the second introductory phase the 12-year-old female and 13-year-old male had been housed together. The final step was to introduce all 5 animals.

Institution: Pittsburgh Zoo
Location: multiple holding cages
Time frame: unknown
Results: successful

Adult male to adult female

A 22-year-old male was introduced to a 38-year-old female. The male (new to the institution) was given 8 day of auditory contact as the first step. The second phase was visual contact for 26 days. The final phase was 42 days of tactile contact via a mesh door. Although no serious injuries occurred, the female received bite wounds to the hands and feet. After approximately 4 to 6 weeks, the animals were compatible however they are routinely separated in the evening.

Institution: Sedgwick County Zoo
Location: large indoor exhibit and 3 off exhibit holding dens
Time frame: 4-6 weeks
Results: successful

Adult male to adult female

A 16-year-old male was introduced to a 31-year-old female. The animals were allowed auditory, visual, then tactile contact. This female had difficulty being compatible with males in the past. Although no serious injuries were inflicted, there were numerous bite wounds. Staff felt that the female has a very dominant personality and continually fought with the male.

Institution: Chaffee Zoological Gardens of Fresno
Location: off exhibit holding cages, then outdoor exhibit
Time Frame: none listed in survey
Results: unsuccessful

Adult male to adult female

A 31-year-old male was introduced to a 34-year-old female. The male had been housed alone at another institution for an extended period of time. A mesh door was put in between their two cages for 11 days prior to the full contact introduction. Due to this male's past intensity with other animals during full contact introductions, he was given diazepam prior to this introduction. During the first day of full contact, quiet periods were interspersed with aggressive fighting as the male repeatedly attempted to position the female for copulation. During these aggressive periods, the female received several puncture wounds, scrapes and a bite wound to her finger which needed antibiotic treatment. The introduction was stopped to allow her time to recover. Several subsequent attempts were made to introduce the two. Despite the fact, the two animals regularly copulated and were housed together continually for 3 months, the introduction was considered unsuccessful. The female appeared to exhibit signs of low level stress due to the male's forcible and intense sexual behavior.

Institution: Brookfield Zoo

Location: off exhibit holding cages

Time Frame: 7 months

Results: unsuccessful

Adult female to adult female

A 31-year-old female was introduced to an unrelated 29-year-old female. The animals were allowed (in order) auditory, visual and tactile contact. Although no serious injuries occurred, the younger female received bite wounds. The two females are housed in adjacent cages at night and are compatible when housed together.

Institution: Chaffee Zoological Gardens of Fresno

Location: off exhibit holding cages then outdoor exhibit

Time Frame: less than one week

Results: successful

Adult female to mixed group

A 29-year-female was introduced to a 25-year-old male. The male was introduced first due to his mellow personality. Next, the 25-year-old female and her 4-year-old offspring were introduced. The 29-year-old female replaced the 25-year-old female as the dominant female. The animals were fully integrated and housed together continuously after approximately 6 weeks.

Institution: Sacramento Zoo

Location: off-exhibit holding cages

Time frame: 4-6 weeks

Results: successful

Mixed species introductions

Adult female to 2.1 siamang family

Adult male to 2.1 siamang family

Adult male to 2.1 siamang family and adult female

Adult female orangutan to 2.1 siamang family

A 31-year-old female orangutan was introduced to a family of siamangs (the adult pair and their juvenile male offspring). The animals were given (in order) auditory, visual, then tactile contact. The introduction was done in their outdoor exhibit to allow the animals as much space as possible. All animals were successfully integrated in less than one week. The siamangs were a bonded pair, both late in their twenties and had a 3-year-old juvenile male offspring. In general, the adult siamangs do not interact with the orangutans. Zoo staff feels that the juvenile siamang was tolerated more due to his age and that he was integral to the success of the introductions.

Institution: Chaffee Zoological Gardens of Fresno

Location: outdoor exhibit

Time Frame: less than one week

Results: successful

Adult male orangutan to 2.1 siamang family

A 16-year-old male orangutan was introduced to a siamang family consisting of the adult pair and their juvenile male offspring. The animals were given (in order) auditory, visual, then tactile contact prior to full contact. The introduction was done in their outdoor exhibit to allow the animals as much space as possible. In less than one week, the animals were compatible. The siamang family is housed separately at night from the orangutan.

Institution: Chaffee Zoological Gardens of Fresno

Location: outdoor exhibit

Time Frame: less than one week

Results: successful

Adult male orangutan and 2.1 siamang family to adult female orangutan

The animals were allowed (in order) auditory, visual and tactile contact.

An adult 17-year-old male orangutan and a family group of siamangs were introduced to a 12-year-old female orangutan. The first phase of the introduction involved introducing the orangutans to one another. The animals were completely integrated after only a few days. The orangutan pair was subsequently introduced to the siamang family in the outdoor exhibit. About one week later, the

siamangs and orangutans were successfully integrated. At night, they share two large rooms and the female orangutan has creep access to the outdoor exhibit.

Institution: Chaffee Zoological Gardens of Fresno

Location: indoor holding cages and outdoor exhibit

Time frame: first phase a few days, second phase less than a week

Results: successful

Summary

Typically there is a high rate of success when conducting orangutan introductions. Of the 52 introductions described in this chapter, 13 were described as unsuccessful. The most challenging introductions involve infants or adult animals. Juvenile introductions had the highest success rate.

Injuries commonly inflicted during introductions are bite wounds to hands, arms, feet and head, and pulled hair or fingernails. Most reported injuries were considered to be minor and only a few individuals required sedation and sutures. Aggressive encounters have been recorded between males and females although male to female introductions are largely uneventful. The number of minor injuries that have been reported to occur during successful as well as unsuccessful introductions indicates that differences between individuals can be resolved. If initial introductions are not successful all options should be reviewed before further attempts are abandoned. A different location or combination of animals may be all that is required.

It must be emphasized that no two orangutans will react in the same way to every situation. Information regarding the personality and social experience of all individuals is essential prior to formulating introduction protocols. Introductions may take longer than anticipated and continual monitoring of the animals is essential.

References

Galdikas, B.M.F. 1981. Orangutan reproduction in the wild. In: *Reproductive Biology of the Great Apes*, ed. C.E. Graham, pp 281 – 300. New York Academic Press

Appendix I

Participating institutions in the introduction survey

Audubon Zoo, New Orleans, Louisiana; Chaffee Zoological Gardens of Fresno, Fresno, California; The Calgary Zoo, Alberta, Canada; Cheyenne Mountain Zoo, Colorado Springs, Colorado; Chicago Zoological Society (Brookfield Zoo), Brookfield, Illinois; Cincinnati Zoo & Botanical Garden, Cincinnati, Ohio; Cleveland Metroparks Zoo, Cleveland, Ohio; Dallas Zoo, Dallas, Texas; El Paso Zoo, El Paso, Texas; Fort Worth Zoo, Fort Worth, Texas; Omaha's Henry Doorly Zoo, Omaha, Nebraska; Houston Zoo, Houston, Texas, Lincoln Park Zoo, Chicago, Illinois; Little Rock Zoo, Little Rock, Arkansas; Memphis Zoo, Memphis Tennessee; Oklahoma City Zoo, Oklahoma City, Oklahoma; Parque Zoologico Benito Juarez, Morelia, Michoacan, Mexico; Philadelphia Zoo, Philadelphia, Pennsylvania; Pittsburgh Zoo, Pittsburgh, Pennsylvania; Rolling Hills Zoo, Salina, Kansas; Sacramento Zoo, Sacramento, California; San Francisco Zoo, San Francisco, California; Sedgwick County Zoo, Wichita, Kansas; Seneca Park Zoo, Rochester, New York; Toledo Zoo, Toledo, Ohio; Topeka Zoo, Topeka, Kansas; Zoo Atlanta, Atlanta, Georgia.