The Gorillas of Mbeli Northern Congo

Western lowland gorillas (*Gorilla gorilla*) have proven a challenge for many who venture to the forests of equatorial Africa hoping to catch at least a glimpse of this subspecies’ life in their natural habitat. Dense forest vegetation and hunting in the past have impeded even the most committed gorilla researchers’ efforts at continuous observation and habituation. Thus, I was somewhat skeptical of Mike Fay’s (Director of the Nouabalé-Ndoki Forest Project in northern Congo) guarantee: if I monitored Mbeli Bai on a regular basis, I would be able to observe gorillas, simply being gorillas, for a significant amount of time. I am a skeptic no more! As Fay and colleagues suspected, gorillas as well as other mammals (black and white colobus monkeys, sitatunga, bush pigs, forest buffalo, elephant and duiker), frequently visit this large forest clearing; some more often than others. Fortunately, considering my interest, western lowland gorillas are frequent visitors. In fact, they were present on 31 days (92 hours) of the 45-day pilot study I conducted at Mbeli Bai in Summer, 1993.

Bai, is the word local Bayaka people (Pygmies) use in reference to the marshy, grassland clearings found scattered throughout the forests here. These clearings vary in size and are usually covered with a thick growth of Cyperaceae, other grass and herbaceous vegetation. Measuring approximately 40 ha, Mbeli is the largest clearing known to date in the Nouabalé-Ndoki Reserve. Gorillas are attracted to this site by at least four genera of plants growing within the clearing, *Rynchospora, Kylinga, Cyperus* and *Hydrochoris*, and the *Aframomum* (a form of wild ginger and a gorilla favorite) which grows along the bai’s edge. Kyoto University researchers working in the northern sector of the reserve have noted a similar attraction to some of the smaller bai’s in their study area. However, Mbeli appears to be truly unique in its size and openness. From a 10 meter high tree platform on the bai’s periphery, I was able to take advantage of the favorable viewing conditions -- relatively low growing vegetation attracting a number of gorilla groups and lone silverbacks for significant periods of time -- to collect data on the demography and behavior of the gorilla population in this eastern sector of the reserve. Below, I share some of my observations.

Gorillas were active in the bai throughout the day, including the mid-day hours of 11:00 a.m. to 2:00 p.m.; with the duration of their visits ranging from 4 minutes to over 4 hours. This is in contrast to the observations of many primatologists (and other field workers) who frequently report their study subjects rest during these hours. In total, at least 8 different groups and 4 lone silverbacks were observed during my pilot study. Of these, I was able to identify 6 groups and 2 lone silverbacks with certainty due to their frequent presence at the clearing and the distinctiveness of each silverback. Observations by other Project members this year indicate there may be as many as 15-20 different groups visiting Mbeli. Group sizes ranged from 5 to 14 members (average 7.5) and contained a single silverback. One group of 8 included a silverback and a relatively large (almost fully mature) blackback male, while another group of 8, seen in the forest, contained 2 silverbacks. These observations are comparable to those reported from other *G. g. gorilla* study sites where direct animal counts have been possible (Jones & Sabater Pi, 1971; Tutin, et al., 1992; Kuroda, 1992; Mitani, et al., 1993; Goldsmith, pers. comm.). The composition of all positively identified gorilla groups remained constant over my study period.

The gorillas’ primary activity while at the bai was feeding. However, the younger animals, which usually finished before the adults, often played, and sometimes adults would take a break and just sit looking around. Gorillas of all age/sex classes were most often observed eating the white bases of *Rynchospora*, followed by *Cyperus, Hydrochoris* and *Kylinga*. A stream runs across the eastern portion of the clearing and cuts through its center (Mbeli, in the native Lingala language, means knife). In sections, this stream reaches over 1 meter depths, yet it does not limit the gorillas’ use of the area. They traveled and foraged in all parts of the bai, moving with relative ease over the marshy substrate. In fact, gorillas spent the majority of their time feeding near the water’s edge where they rinsed mud off the plant bases/ rhizomes, by swishing them in the water before eating. Such behavior was a common part of the gorillas’ feeding repertoire at this site. They also did not hesitate to enter the stream to reach islets of *Cyperaceae*. It was not unusual to see silverbacks standing in chest-deep water, pulling vegetation from these islets or the stream bank.

When crossing the stream, the gorillas entered quadrupedally, knuckle-walking until they reached deeper water. They then continued on bipedally, always holding their arms and hands above the water’s surface, sometimes even above their heads. (For those of you who remember the song “Walk Like An Egyptian”, this is precisely the pose struck by some of the apes as they... (Continued on page 2)
waded through the water!) This was true of the juveniles as well as the adults. Females carrying infants made no effort to keep them out of the water. On one occasion, a young gorilla (from a group of 5 which was not often seen here) appeared to be having difficulty finding a suitable location to cross the stream. The rest of the group was on the opposite side of the water making their exit. The youngster proceeded to whine loudly, pacing along the bank. The silverback of the group returned, crossed back over and led the younger gorilla to a shallower site where they both crossed. These observations are contrary to early reports that gorillas were never seen entering water or crossing even shallow streams (Merfield & Miller, 1956; Schaller, 1963). While more recent studies have provided evidence that both western and eastern lowland gorillas do forage in marshes, swamps and streams (Casimir, 1975; Fay, et al., 1989; Williamson, et al., 1988), mountain gorillas apparently do still prefer to avoid such aquatic activities (Watts, Robbins, pers. comm.).

Groups and/or lone silverbacks were simultaneously present at the bai on 11 occasions. Eight times, intergroup interactions or encounters between lone silverbacks were observed. The majority of these can best be described as calm or neutral. Several meetings between two lone silverbacks could be classified as aggressive or tense (chest-beating displays, strutting, spashing through the water and/or tight-lipped facial expressions were observed); however, none resulted in direct physical conflict. In fact, most of my observations resembled early descriptions given by Schaller (1963) and Fossey (1983) for mountain gorillas. When more than one group was present in the bai, the animals either ignored each other or mingled without incident, especially the juveniles who often played, or seemed to subtly monitor one another, the silverbacks in particular. No patterns of association between specific gorilla groups were apparent during this study period which would have indicated to me that they were habitually traveling together (i.e., it was not always the same combination of groups present simultaneously). On one occasion, a minor skirmish broke out between the juvenile male of one group not often seen at Mbili and two juveniles from a "regular" Mbili group. In this case, it was this juvenile's mom with an infant riding on her shoulders that ran to intervene in the fight. The silverback males of both groups continued to feed, seemingly oblivious to the outburst.

The maximum number of gorillas present at any one time was 31 - 4 groups and 1 lone silverback. This occurred during a rainstorm. Even though rainfall was quite heavy at times, the gorillas continued their activities despite the downpour. On average, the most gorillas and some of the longest observation times I logged were on the days it rained!

The silverback male has often been described as the coordinator of group activities and the focal point of female gorillas and their offspring (Fossey, 1983; Harcourt, 1979; Schaller, 1963; Stewart & Harcourt, 1987; Yamagiwa, 1983). During this study, I also found some evidence of this. In most cases, the silverback was the first group member to enter the bai and to initiate departure. However, on occasion, an adult female or another group member appeared to lead travel. There were also instances when an individual from the group stayed behind to continue feeding (in one case a subadult male, in another, an adult female with her dependent infant). Other times, leadership by any one individual was not obvious.

To communicate his intent to leave, several different behaviors by the silverback were observed. Most often, he would simply approach the periphery of the bai and sit there, glancing over at the rest of his group. On some occasions, a "hoot series" or chest-beats were added to attract the group's attention. Once, after a group had been present for over four hours, the silverback strutted past the female who was still feeding. He paused, looked over at her, then traveled on for about 15 meters. She continued to feed, glancing often to where the silverback sat. Five minutes later, she walked past him, out of the bai. The silverback and two juveniles of this group then followed on the same path.

Individuals' proximity to the silverback while in the bai was variable. This may have been in order to avoid feeding competition, though overt aggression over feeding sites was extremely rare. I did observe females with infants staying close to the silverback, especially when other groups were present or chest-beats were heard from beyond the clearing. There were also cases when the silverback appeared to be responsible for maintaining proximity to the female. Independent infants and juveniles were observed to spend some time near the silverback, but, just as often, they could be seen feeding alone or playing with other members of the group.

One possible predation threat to gorillas foraging in the bai are crocodiles. While a crocodile may not be able to kill a large silverback, one could take down a young gorilla, especially if the ape is caught unaware. Evidence of leopards (Panthera pardus) fatally wounding adult chimpanzees demonstrates that even large-bodied primates are not immune to attacks by predators (Boesch, 1991). A crocodile was spotted several times in the stream and sunning itself on an islet of Cyperus. In one case, a crocodile seemed to be stalking a silverback who was feeding in the stream, not more than two meters from it. When the silverback sighted the crocodile moving towards him, he calmly, but quickly, left the stream and joined the rest of his group. Another time, a lone silverback was foraging near the stream. Abruptly, he jumped up and fled from the spot. He even turned a somersault in his haste to leave that area. This silverback settled down again at some distance from the stream, but kept a watch in the direction from which he had fled. A half-hour later, he was feeding in another part of the stream, when again something in the water or on the bank startled him. This time he ran through the water and left the bai.

Most of the time, the gorillas never looked up in the direction of the platform. On the few occasions when they did spot observers, the gorillas' reactions varied. Some individuals simply watched us for several minutes, then resumed their previous activity. A young lone male continued to intermittently glance back up towards the platform after noticing he was being watched. He departed 20 minutes later. The same individual returned on 4 other days after this event. Each time, he looked up towards the platform before settling to feed. The only aggressive reaction to an observer came from the silverback of a group not often seen at the bai. The adult female was feeding just below the platform. Her infant spotted me, she looked up, gave a scream and ran into the forest below. The silverback immediately ran over to the base of the tree. He stood their in a stiff-armed stance, staring up at me for approximately 3 minutes. Every time I made a slight move, he "barked". He then moved off into the forest to join the rest of the group.

Obviously, it is impossible (and impractical) to include all observations in this brief article. I simply wanted to share some of the highlights with readers to illustrate the variety of information I was able to record during my relatively short study.
Observations at clearings such as Mbeli present the opportunity to learn much more about the social system of western lowland gorillas in their natural habitat. Such information can be useful to both the in situ conservation of this subspecies and the continued success of captive management programs. I look forward to returning to Mbeli in January, 1995 to begin the long-term study of gorilla behavior at this site for the Nouabalé-Ndoki Project and my own Ph.D. dissertation. Hopefully, I will be able to keep Gorilla Gazette readers informed of our findings.

I would like to express my appreciation to the WCS Nouabalé-Ndoki staff members who made this pilot study and my future work at Mbeli possible, the Kyoto University research team, and both western lowland and mountain gorilla researchers who have provided me with information and advice from their own work in the field. Thanks also goes to le Ministre des Eaux et Forêts for permission to work in the Republic of Congo and the faculty members at Washington University and the University of Missouri, St. Louis for their support throughout the development of my study. And finally, a special thanks must go the Ape House staff and apes at Lincoln Park Zoo, Chicago, who taught me a great deal about gorilla behavior.

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References and Related Articles


Results: A Petition for Peace in Rwanda

The Columbus Zoo and the Dian Fossey Fund co-sponsored “A Petition For Peace In Rwanda”. To facilitate distribution of the petitions, we utilized the international network and format developed during petition campaigns in 1991 and 1993.

On May 3, 1994, we faxed and mailed petitions to zoos, museums, universities, non-profit organizations and individuals. People of diverse backgrounds from around the world mounted an energetic campaign in their communities. In only eight weeks, we received signatures from citizens in 50 countries, including every state in the U.S. Petitions were distributed by the following: 84-Zoos and aquariums, 45-Universities, 35-Non-profit organizations, 80-Businesses, 65-Schools - All grade levels, and individuals in 50 countries.

People from the world community demonstrated that they were concerned about the people and wildlife in Rwanda and were willing to do something to help!

On July 29, 1994, the petitions were delivered to the U.S. Mission to the UN. Ambassador Madeleine K. Albright stated in a letter dated August 11, 1994, "I wish to thank your colleagues for their strong commitment to the people of Rwanda and for bringing peace to the region". During the three petition campaigns, more than one-quarter of a million people have signed petitions. This would not have been possible without the hard work of thousands of concerned citizens. We wish to thank everyone who distributed and collected petitions. Your efforts on behalf of the people and mountain gorillas of Rwanda are greatly appreciated. Our voices were heard ...

Charlene Jendry, Petition Coordinator, Columbus Zoo  
Greg Movision, Petition Coordinator, The Dian Fossey Gorilla Fund
The Use of Feed Tubes in Passive Untrained Hypodermic Administration

One of the most traumatic events for gorilla and caregiver alike involves the administration of drugs via hypodermic syringe. The procedure may involve physical restraint, trickery, the use of syringe pole, dart gun and other. Each of these methods will be similar in that the gorilla (and other non-focal gorillas) will generally become excited or agitated with consequent physiologic changes in hormone levels and elevations in blood pressure. This often competes with the goal of the drug administered, as well as increasing gorilla belligerence towards the veterinarian, thus impeding present and future observation and diagnosis.

Some zoos have had considerable success in training gorillas to accept administration of drugs via syringe through body presentation and positioning. Improved testing procedures, treatment and overall effectiveness have been seen as a result. From the Calgary Zoo’s perspective there are a few difficulties with this approach.

Firstly, the time available for intensive training is very limited. Secondly, initial attempts at training showed that sessions had a tendency to reduce normative daily gorilla social interaction as well as reducing the amount of time the gorillas spent in public viewing areas. Finally, not all gorillas responded to training in the same manner. This was most pronounced in Julia, a female previously diagnosed with a lazy right eye. Her reduced focusing ability resulted in her being startled at the sight of the shiny syringe in virtually every training event. In her case, at least it was apparent that consistency of administration would be a problem.

With these considerations in mind, a feed tube was constructed as seen in Figure 1. The gorilla would reach down the length of the tube for food retrieved, thereby exposing the forearm or bicep muscle areas to a long slotted area for hypodermic administration. The feed tube was based on a number of similar objects used for lower primates, including mandrills. The primary difference was no training would be necessary to achieve the goal of administering the drug. Food place in the open tube was place far enough back that the gorilla had to reach for it. The individual placing the food in the holes (see diagram) would be partially positioned behind plywood, visually blocking view from the front, top and side. When the gorillas arm extended, the exposed arm would be injected near the distal end of the slot, to compensate for any pulling back of the arm.

As Tetanus boosters were necessary for four individuals, the procedure was carried out in by veterinary staff on the same day the feed tube was constructed on the enclosure mesh. Administration was successful on a blackback and a 33 year old female. A silverback followed these two and after some hesitation and display (perhaps due to the presence of the veterinary care team) also extended his arm in the tube. A ten year old female initially did not receive the full amount in the syringe, but repeatedly extended her arm for food and the booster was completed. This fact gives credence to the notion that in terms of hypodermic injection, it is the process that causes the greatest stress and not the actual injection itself.

It should be noted that this technique is intended for a small syringe volume and fast administration. In this regard, most vaccines and boosters would be applicable, as would initial tranquillization for most individuals. High viscosity liquids and high volumes would not be indicated using this technique, unless training took place.

The design itself is quite simple to construct. As seen in Figure 2, an open ended polypipe has a long slot cut into it using a jigsaw 45° to a line of 14 holes where food items may be dropped. It is affixed to any pipe or bar at the dissent end and placed through a circular slot extending through a 3/4" plywood board (D) to the mesh area. The plywood board (38" w x 27" h) is displayed from the mesh by a 2" x 4" frame which acts as a spacer and serves to increase viewing difficulty of the gorilla extending its arm. Plywood boards are then set on a 90° angle to the side right beside the tube (C = 23" x 17") and on top (B = 10" x 38°). These boards make it virtually impossible for the gorilla to view the individual responsible for the injection and placing food in the tube.

Given the fact that most vaccines and tranquilizing agents rarely exceed 2cc, in volume, speed and safety in this technique should considerably ease hypodermic injections for gorillas and the reduction in excitability will hopefully benefit gorilla husbandry.

For further information:

Rob Sutherland
Senior Ape Keeper
Calgary Zoo

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Drawing by Kathy Twamley
Feed Tube Design for Hypodermic Administration

Figure 1

POLY PIPE

3/8" THICK
5 1/4" INNER DIAMETER

Figure 2

45° - SLOT POSITION

90°
Effie Found Dead
One of the Oldest Known Mountain Gorillas

Effie, a grand-matriarch gorilla, believed to be at least 40 years old, was recently found dead in the Rwanda rainforest. Effie was a member of Dr. Dian Fossey's famous study group 5 and, until her death, was one of only three gorillas surviving from the era which began in 1967 when Fossey started work at the Karisoke Research Center. It is believed Effie died on April 26, 1994. The cause of death is unknown.

Rwandan trackers from the Karisoke Research Center, operated by the Dian Fossey Gorilla Fund, reported her death to H. Dieter Steklis, Ph. D., Fossey Fund Executive Director. Said Steklis: “Effie presumably died of old age. There may have been some precipitating event, like a cold, but certainly no evidence of foul play. I’ll certainly miss her in my next visit to her group.”

Perhaps an omen, Effie was reported missing from her group earlier this year. Pascale Sicotte, Ph. D., Director of the Karisoke Research Center, said: “We had a false alarm in January and February when, for a few weeks, we did not see her.” Trackers searched without success and then, one day, Effie reappeared unexpectedly. She may have been sick and following the group very slowly. We were relieved when we saw her, but we knew she was old and we were expecting her death. I hope she died in peace.”

Described by researchers as a self-assured gorilla with high status in an especially strong family group, Effie lived in Rwanda’s Parc National des Volcans. The park is a rainforest preserve for half of the world’s remaining 650 endangered mountain gorillas. The balance of the mountain gorilla population resides in the Impenetrable Forest in Uganda. While a bloody civil war rages in the cities and villages of Rwanda, resulting in the deaths of as many as 500,000 people and the exodus of millions more, conditions in the park are relatively calm. No gorilla injuries or deaths resulting from the war have been reported since the fighting began in April.

When Effie was first identified by Fossey in 1967, it is estimated that she was about 13 years old and had given birth to at least one infant. According to Karisoke records, Effie has had seven known offspring, all females, and another seven grandchildren, making her a very successful mother by gorilla standards.

Reaching Duke University, David Watts, Ph. D., Chairman of the Scientific Advisory Committee of the Dian Fossey Gorilla Fund and former colleague of Fossey, said: “Effie was a wonderful mother and really put a lot into looking after her babies. Having all seven survive is doing extremely well.” Because of her age, Effie holds a prominent place in gorilla research. Watts continued: “Gorillas live such a long time and are such complicated animals that for us to understand their lives and get a good picture of their behavior and social system depends on having a long history on specific individuals. Knowing about 27 years of Effie’s life is scientifically important.”

In spite of the devastating civil war, the Fossey Fund’s Karisoke Research Center is continuing its gorilla tracking and antipoaching work. Rwandan staff who fled to Zaire when war erupted have returned to camp and rejoined the Rwandan antipoaching patrols and trackers who remained to monitor gorilla well-being.

Director Sicotte returned to the area on June 20; Steklis will join her in early July. They set up temporary operations in Zaire and coordinated work with the Rwandan staff and park officials from both countries. Said Sicotte: “The amplitude of the war is horrifying. We can’t predict how or when it will end or even when the situation will get better. In the meantime, we are working to preserve the mountain gorillas and their habitat and undertaking the expenses of running the Parc National des Volcans. When the Rwandans get back on their feet, these natural resources will be available for tourism which is so important to Rwanda, economically speaking.”

Effie and her daughter, Mehane. Copyright Dian Fossey Gorilla Fund, 1986.

The Dian Fossey Gorilla Fund
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Take this opportunity to exchange, learn, teach, and generate innovative ideas.

The Columbus Zoo is pleased to announce that we will be hosting a conservation conference on 13th - 16th July 1995 titled, ZOOS: Committing to Conservation.

Our goal is to bring together field researchers and zoo personnel from all levels in order to promote in-situ conservation and use already existing projects as concrete examples of how a commitment to conservation is in the best interest of zoological institutions.

By bringing together a diverse field of people we hope to increase networking among zoos, small NGO's, large conservation organization, academicians, and field researchers.

**TENTATIVE TOPICS**

Connecting with a large conservation organization.
Connecting with small N.G.O.”s
Sources for seed money
Environmental Education Projects.
How to start a conservation project on 1,000 dollars.
Keeper initiated conservation projects.
Utilizing volunteer talent as a conservation resource.
The role of zoos as a support infrastructure.
Sponsorship of biologists in the field
Assessing the benefits to indigenous people.

For more information please contact: Beth Armstrong
Ape House
The Columbus Zoo
P.O. Box 400
Powell, OH 43065-0400
(614) 645-3426

Please mark appropriate box:

☐ I am interested in additional conference information.
☐ I would like to attend the conference.
☐ I would consider presenting a paper.

Name ____________________________

Address ____________________________

City ____________________________ State__________ Zip__________

Affiliation ____________________________
Announcements

GORILLA BEHAVIOR ADVISORY GROUP HAS A NEW MEMBER

The Columbus Zoo is pleased to announce that Charlene Jendry, gorilla keeper at the Columbus Zoo, has been appointed to serve on the Gorilla Behavior Advisory Group Board. It is our hope that her experience and expertise will enhance the already existing work being conducted by the Gorilla Behavior Advisory Group Board. Congratulations, Charlene!

CONSERVATION CONFERENCE

The Columbus Zoo announces that it will be hosting an international conference on conservation in July of 1995 (see enclosed flyer). The conference, titled Zoos: Committing to Conservation, will focus on the role of zoos as support infrastructures for in-situ conservation with a special emphasis on community based initiatives. We hope to bring together a varied array of individuals from zoos, NGO's, academia and large conservation organizations in order to promote active conservation on the part of zoos. In addition, our goal is to showcase ongoing projects that have proven successful. The role of keepers as initiators and facilitators has a special emphasis concerning grassroots projects. If interested in more information, please return the enclosed flyer.

GORILLA WORKSHOP I CONSERVATION FUND

The Columbus Zoo has chosen Claudia Olejniczak as our first recipient of $1,300 from money raised at the first Gorilla Workshop. Claudia, a Ph.D candidate at Washington University in St. Louis, has been conducting a study of western lowland gorillas at the Nouabalé-Ndoki reserve in Congo (see enclosed article). Her observations thus far have proven fascinating and hopefully will help to influence how we manage gorillas in captivity.

The deadline for the 1996 funding ($1,300) from the Gorilla Workshop I Conservation Fund is August 15, 1995. We would encourage keepers to apply with the knowledge that you do not necessarily need to be conducting the study yourself in the field in order to qualify, but rather offer assistance to an already existing study by a field biologist. Please enclose the following information when applying:

- Name
- Zoo affiliation/academic affiliation (or both)
- A brief summary of your experience working with gorillas
- Resume
- A brief explanation of the project
- Who will be the field contact person

The following are suggestions of possible uses for the money:

- Supply equipment for in-field primatologist (i.e., walkie-talkies, camera, video, camping equipment, etc.).
- Publication and mailing of a newsletter from a primatologist in the field.
- Educational leaflets, coloring books, posters, crayons, etc. for indigenous children.
- Analysis of food utilized by gorillas in the wild.
- Support for a community based project that will benefit the local economy.

Please send applications to:

Beth Armstrong
The Columbus Zoo
P.O. Box 400
9990 Riverside Drive
Powell, Ohio 43065-0400

JAPANESE GREAT APE KEEPER SEEKING INFORMATION

Some time ago I received a letter from Toshikazu Abe from the Sendai Yagiyama Zoological Park. He is interested in helping some Japanese veterinarians compile data on gorilla diseases and necropsy data. They are especially interested in acute cardiac failure. Their hope is to use this information to improve health care for their animals and to increase communication with other gorilla keepers and caregivers. Please send information to me for forwarding or directly to Toshikazu. Thank you.

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GREAT APES CALENDAR AVAILABLE

Sales of GREAT APES will benefit the Leakey Foundation, founded by renowned anthropologist Louis B. Leakey. The calendar pictures mountain gorillas, a bonobo, western lowland gorillas, orangutans and chimpanzees - our closest relations in the wild - and also explains their plight. Each photo is also accompanied by a descriptive caption. The retail price is $10.99.

"GREAT APES 1995" is available in bookstores, gift shops and direct from the publisher. To order direct, send check or money order, including $3.50 per shipping location, to Tide-mark Press, P.O. Box 280311, East Hartford, CT 06128-0311. MC and VISA orders are welcome - call toll-free at 1-800-338-2508 9 - 5 EST. Wholesale inquiries welcome.

Information Sought Regarding Dental Development and Eruption In The Gorilla

Dental development and emergence ("dental age") are one of the best approximates of chronological age, especially when combined with other measures of developmental age, e.g., number of secondary epiphyses present in the postcranial skeleton, degree of epiphyseal fusion in the postcranium, and hormonal or physiological changes associated with puberty. These developmental indicators are routinely used to establish age and identity in human forensic cases by comparing the state of an individual's development with established norms. In the case of the great apes, these developmental parameters offer one means of approximating the age of apes which are being reintroduced to the wild (after being confiscated from private owners) and wild apes (including
those in capture and release programs). However, with the exception of the chimpanzee (Pan troglodytes), very little has been published on the skeletal and dental development of known age great apes beyond the first year of life. Because of the paucity of information on gorilla skeletal and dental information, I am requesting the help of and information from zoos, zoo curators, and other captive facilities which may have collected information on dental emergence or taken routine radiographs which could document dental or skeletal development.

I am interested in information on when any or all of the deciduous (or primary) or permanent (or secondary) teeth erupted through the gums into the oral cavity in known age gorillas. If tooth eruption status information was collected during routine physical examinations and body weights are also available to correlate with the tooth status information, I would also be interested in that. In addition, I would like information on the sequence of eruption of the permanent teeth in the gorilla and at what ages their permanent dentition is complete. I would be particularly interested in examining lateral radiographs of the cranium or of any of the remainder of the skeleton, particularly of the wrist and hand or ankle and foot of immature gorillas. Radiographs would allow me to document dental development beyond tooth emergence and skeletal development. My goal is to accumulate a large enough data set to begin to establish norms for dental and skeletal development in the gorilla. Such information should be useful for monitoring captive ape development and for approximating wild ape chronological age.

If you have any information or radiographs which might be useful, please contact me by telephone, mail, email, etc. at the address below. Could you also please contact me if you are willing to gather information for me? Thank you.

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Primate-Talk –
A Discussion Forum for Primatology
The Wisconsin Regional Research Center (WRPRC) at the University of Wisconsin - Madison hosts an electronic mail listserver called PRIMATE-TALK (P-T). PRIMATE-TALK is an open forum for the discussion of primatology and related subjects. This forum is open to electronic mail users world-wide with an interest in nonhuman primates. Currently, there are over 550 members from thirty countries. Subject matter may include, but is not limited to:
• News Items • Meeting announcements • Research issues • Information requests • Veterinary/husbandry topics • Job notices • Animal exchange information • Book reviews
Some special features on PRIMATE-TALK include (1) the Primate-Talk Meetings Calendar, (2) the Primate-Talk Directory of net members and (3) an archive of P-T messages.

People with Internet, BITNET or UUCP addresses can communicate with PRIMATE-TALK. Users of other networks should contact the WRPRC. If you are interested in joining PRIMATE-TALK, send a message to primata@mail.wisc.edu and indicate that you would like to sign on. The WRPRC will send you information about the network and you will be asked to briefly introduce yourself.

Once you are on Primate-Talk, you can send messages to primeatalk@primat.wisc.edu.

To make suggestions or for more information about Primate-Talk, contact Larry Jacobsen, Head of Library Services, Primate Center Library, Wisconsin Regional Primate Research Center, 1220 Capitol Court, Madison, WI 53715-1299 USA. Phone: (608) 263-3512 Fax: (608) 263-4729 Email: library@primat.wisc.edu; Tel: (608) 263-3512; Fax: (608) 265-4729.

International Directory of Primatology
The Wisconsin Regional Primate Research Center, University of Wisconsin, Madison, announces the publication of the second edition of the International Directory of Primatology. The purpose of the directory is to enhance communications among organizations and individuals involved in primate research, conservation and education. It can be used by primatologists as a desktop working tool or by educators, librarians, students and the general public as a guide to primate programs and information resources.

The directory is divided into four organizational sections and five indexes. The organizational sections cover (1) geographically arranged entries for major primate centers, laboratories, educational programs, foundations, conservation agencies and sanctuaries, (2) groups involved with nonhuman primate population management, (3) professional primate societies, including the membership roster of the International Primatological Society, and (4) major information resources in the field. Access to this information is supported by organizational, field site, species, subject and name indexes.

Copies of the 1994 International Directory of Primatology, 2nd edition (354 pp., spiral bound) are available in the USA for $15 each, or in other countries for $23 each (US). These prices include postage and handling. Electronic mail and phone orders are welcome. Institutions may want to consider purchasing multiple copies as reference tools for their staff. Please make checks payable to: Wisconsin Regional Primate Research Center. Send orders to:

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Symposium to be held March 12, 1995
The New World Primate Taxon Advisory Group of the AZA will hold a symposium on the Nutrition and Medicine of New World Primates preceding the Great Lakes Regional Meeting of the AZA. Call Dr. Peregrine Wolff at the Minnesota Zoological Garden at (612) 431-9361 or fax (612) 431-9367 for more information.
The Gorilla Gazette Staff is trying something different! At the end of each issue we will have a supplemental section dealing with various husbandry topics. In this issue, we address the gorilla/caregiver relationship topic and also supply a variety of pros' gorilla diets. We urge you to tear out this supplement and begin your own Gorilla Keeper Manual. Next issue we will address enrichment/enhancement and exhibit design. We encourage you to contribute, so please send your articles to the gorilla staff at the Columbus Zoo, 9990 Riverside Drive, Box 400, Powell, Ohio 43065-0400.
The Many Roles of Gorilla Caregivers

AN OVERVIEW
By Beth Armstrong
Columbus Zoo

Each institution has its specific philosophy concerning the care of captive gorillas and the role that caregivers play. I believe that hands-on care via mesh or bars is of utmost importance in establishing a trusting relationship between gorillas and their caregivers; certain institutions such as Apenheul and Howletts go one step further by entering enclosures containing an entire group of gorillas. Recognition of individual gorillas’ personalities and social nuances, body language and voice intonations by the caregiver are all essential components in winning the trust of any one gorilla.

The responsibility of creating a stimulating and diverse environment coupled with a providing sense of security for the gorillas, falls directly on the caregiver’s shoulders. The following three participants will give their thoughts and philosophy on the success of husbandry of gorillas in their own words without the benefit of editing.

What I would like to strongly recommend is the recognition and inclusion of gorillas’ caretakers in the decision-making process within each institution housing gorillas. The caregivers are the voices for the gorillas, their role as such is essential if we are to improve husbandry techniques of gorillas. Caregivers play an integral role in the successful establishment of fully socialized, age diversified groups of gorillas.

I would urge each institution to incorporate keepers’ ideas in building new enclosures, renovation of already existing enclosures, dietary changes and enhancements, introductions of infants, juveniles and older animals that may not have had the benefit of a social existence. Management of gorillas in captivity must be viewed from a holistic standpoint with all expertise including veterinary, curatorial and caregiver experience being both valued and utilized. If any one segment of this holistic circle is missing, then the potential for the best possible care for captive gorillas is diminished.

The Natural Approach to the Gorilla/Caregiver Relationship

By Rob Sutherland
The Calgary Zoo

Those working with gorillas are well aware of the remarkable changes that have taken place in virtually all aspects of gorilla care. The attitude of a distant, darker age was less concerned with the unique inherent qualities of this social species and concentrated energies towards basic housing, feeding and cleaning. Largely as a result of knowledge gleaned from observations of wild gorillas, an increase in understanding and empathy towards the species has taken place, and the recognition of the need and benefit of a complex physical and social environment for the gorilla is generally acceptable by zoos throughout North America and Europe.

The implementation of a more naturalistic approach to caregiving is exciting and challenging and the caregiver/gorilla relationship offers much potential in allowing the captive gorilla to fully express the psychological, physical and social nature of its unique genetic design. Each zoological institution will have a particular mandate varying relating to education, research, entertainment and conservation. Although the caregiver may play a role in all of these, it is essential that he/she consider all of these mandates in light of the prime notion of what is best for the gorilla. In essence, caregivers have a sacred trust where expediency is secondary to the needs of the species in their charge. A progressive caregiving/gorilla protocol involves more than just hands-on interactions; in fact, many facets of gorilla husbandry are involved. Caregivers will have a greater overall effect on the captive gorilla than any other group of humans, and if we believe the zoo to honestly represent genuine empathy and respect towards the gorilla, then the responsibility is clear to all that this respect be shown in every facet of their lives. The caregiver should be concerned not only in dealing with what is but what should be in terms of the well being of both individual and troop.

Two major factors important in the development of a successful gorilla/caregiver relationship relate to the caregiver:

1. Attitude

It is very important that consistency from all caregivers be shown toward the gorilla. The personalities of humans in general shows startling variation in ability, understanding, communication, enthusiasm, initiative, intelligence and any number of descriptive qualities. However, the caregiver has a responsibility to act in a manner which will cause the least amount of stress to the gorilla’s day and encourage the normative expression of the ape as much as possible.

Factors in each caregiver’s personality that would limit this expression should be minimized. Loss of temper, excessive anger, and loud or abusive behavior are just some examples of qualities that one should avoid. The continual imposition of the human personality on the gorilla will also be a very negative factor over time and one should limit this, however well intentioned.

2. Interpretation

The genetic proximity of the caregiver to the gorilla invites across-species generalizations which may or may not have validity. One must always be sure to recognize that inter-specific comparisons will inevitably result in considerable bias unless knowledge of the species in the wild is incorporated in all interpretations of gorilla behavior.

The natural approach to the gorilla/caregiver relationship assumes the social and physical environments of captive gorillas must function in a similar manner to that seen in the wild. In order to truly satisfy the species psychological and social needs. This particular husbandry approach adopts a set of guidelines in order to accomplish this:

A. Maximize gorilla/gorilla social interaction in order to optimize gorilla behavior.
B. Minimize those features in the captive gorilla’s environment which either serve no function, impede or threaten the development
and maintenance of the species unique psychological and social need.
(C) Realistically maximize natural aspects of captive gorilla behavior in all caregiver/gorilla interactions.
(D) Intervene in as naturalistic a way as possible when the existing social and physical environments are not conducive to the physical needs and natural expression of the gorillas. This will often be seen in gorilla socialization as well as hand raising of infants.

The natural approach has a number of benefits, but when one considers the present variation in zoos and their philosophies, variation in husbandry programs, variation between caregiver techniques, variation in social experience, and variation in the social and physical environments of the gorilla, it seems that the ultimate benefit is in providing a program which is consistent and which all gorillas can potentially relate to in present and future zoo environments.

SENSORY COMMUNICATION

Communication between the caregiver and the gorilla is a fascinating area in that it involves continued decision making on the part of the caregiver as to the type and degree of communication between the two species. As well, it is important to note that indirect inter communications may form a significant part of a gorillas day, variously visual, auditory, olfactory or tactile. It is essential for the caregiver to adopt a philosophy which sees maximizing the normal social behavior of the gorilla and the troop as the ultimate goal. Although it may be an integral part of captive gorilla husbandry, human/gorilla communication should not be seen as necessary to the social needs of the gorilla expert in exceptional circumstances such as hand raising or spending time with sick or socially ostracized individuals.

However, the nature of the caregiver's role demands that communication is achieved in one way or another and the knowledge of the gorilla in the wild should be incorporated in communication protocol.

1) Audition

As the wild gorilla generally has a quiet day (as evidenced by a 16-18 hour rest period), it is important for caregivers to show respect for its captive counterpart by avoiding loud, sharp sounds as much as possible and keeping low tones when vocalizing to or around the gorilla. In this way, the gorilla will be much more relaxed in attitude and will tend to be less intent on social involvement with caregivers and more intent on the activities of the troop.

Caregiver communication can be expressed in both human and gorilla language. The most used vocalization is the soft, contented guttural grumble and can be extremely relaxing and reassuring to the gorillas, especially first thing in the morning. Other expressions such as chest slapping or intention movements may be valuable in some situations as well. It should be mentioned that loud sounds, whether vocalizations or not, can be detrimental and can ultimately cause significant stress to the animal, especially if over a prolonged period of time. At the very least, loud and/or high pitched sounds can cause an individual to express inappropriate behavior to itself and/or others.

2) Vocal Communication

In general, try to avoid staring at the gorillas directly and avoid their stares. Be aware that the gorilla interprets facial expression and body movements from its own perspective. Rapid movement by the caregiver will tend to result in an increase in excitement levels and may alter behavior of the individual and troop. Many caregivers have experienced situation where the gorilla(s) will literally spend the entire day viewing their caregivers' actions (which are most likely quite interesting to them), so it is highly advisable that visual interactions are limited in most situations. Try to provide an environment that is reflective of its wild counterpart, where privacy and seclusion are never far away and the animal has some choice of movement.

3) Tactile Communication

Tactile communication is much less frequent in gorillas than chimpanzees and grooming generally plays less of a social role. In addition, the close genetic similarity presents the potential of human/gorilla disease transmissibility, so try to limit tactile interactions as much as possible whether in training or play. On the other hand, handraising gorilla babies requires a great deal of tactile interaction and will be covered in that area.

4) Olfaction

Sense of smell is another aspect of communication and the caregiver must be sure that any odors (i.e., soaps, bleaches, perfumes) do not mask or reduce the ability of the animal to use this sensory tool.

REINFORCEMENT TECHNIQUES AND THE GORILLA/CAREGIVER RELATIONSHIP

Establishing effective reinforcement techniques is essential in any gorilla husbandry program. The reinforcement philosophy is often reflective of both caregiver and management protocols and depends heavily upon the knowledge and enlightenment of both. It is extremely important to appreciate a few points in the development of a reinforcement philosophy:

(A) The animal's right of individual expression must not be limited by the caregiver. Many of those caring for apes often experience occasions where the gorilla may spit at the caregiver, throw objects (including feces and branches) or try to grab clothing, etc. The caregiver role at this time should be to exhibit self control and incorporate an appreciation of the gorilla in its natural environment and the limits imposed by the captive environment. Often times, directed expression towards the caregiver is a consequence of a natural social behavior and negatively reciprocating towards that expression can affect both the individual and other troop members due to the unnecessary and external manipulation and sublimation of a natural expression. The goal of a normative gorilla and a stable, well adjusted troop should be paramount.

(B) Expediency should be secondary to the needs of the gorilla in a caregiver's charge. Gorillas will often show a reluctance to conform to an exact schedule, but will be most likely to be willing to change their environmental situation when caregiver actions are positive (or even neutral) in nature. The intelligence of the gorilla ensures reciprocity of any negative reinforcement whether recognized by the caregiver or not and can take its form in social aggression, individual behavior changes, refusal to move and resentment towards caregivers. It cannot be understated that our actions are the true reflection of what the caregiver believes the gorilla to be.

(C) Finally, a reinforcement technique should be consistently presented as possible. Each caregiver should standardize reinforcement with other team caregivers so consistent responses by the gorillas may be achieved.

HANDRAISING

With regard to the social development of an infant gorilla, there are
essentially five different types of gorillas existing in zoos today: (1) wild born, (2) captive mother raised with social benefit, (3) mother-raised alone, (4) hand-raised with social benefit, and (5) hand raised without social benefit.

The inherent experiential differences are obvious and the goal of every caregiver is to provide social development that will best prepare the young gorilla in its social interactions within its future troop.

The hand raised gorilla requires extensive and almost continual contact with the caregiver during the first months of life and the use of cribs, etc. should be limited except where medical reasons make separation necessary. The first six months will form the basis upon how the gorilla adjusts and learns of its environment. The number of caregivers should be kept to a minimum and be knowledgeable of all aspects of gorillas' behavior.

The caregiver/gorilla relationship should be attentive to provide nurture and comfort for the infant. In addition to physical care, psychological care is important to the infant and is achieved in two ways. The first is in attempting to provide all elements of communication (tactile, visual, auditory, olfactory) that the mother would normally provide. In addition to providing comfort and warmth, the caregiver's talents in providing this sensory stimulation is key to the animal's ability to learn and adjust to the environment. Many zoos throughout North America have a wealth of knowledge with respect to the above and the reader is encouraged to take advantage of this, but suffice it to say that vocalization, expression, reinforcement of negative behavior, tactile stimulation, and play between caregiver and infant should be expressed in terms that representatively compare to wild gorilla mothers.

The second aspect of psychological care is to try to maximize social experience with other gorillas as much as possible. The social intricacies of the troop are best learned by the infant as early as possible. Setting up the nursery along the troop's enclosure can provide great benefit to the babies' long term well being, but if this is impossible, exposing the gorilla to other gorillas with an eye to early reintroduction is highly advisable. The caregiver's role in the area of social learning will depend on social circumstance as well as the personality of the infant, but should always provide the security and support the young one needs.

**MANAGEMENT INVOLVEMENT**

Modern zoo management personnel recognize the importance of communication with the caregiver in order to improve not only gorilla husbandry, but the overall effectiveness of the zoo as an organization. It is therefore essential that the caregiver communicates any concerns or information that will either represent the needs of the gorilla or improve upon an existing situation.

**CONCLUSION**

Ultimately, the relationship that exists between gorilla and caregiver will reflect a philosophy that will play an integral part in captive gorilla husbandry. What is important is the realization that the caregiver has the responsibility to put ideals and goals into action in often less than ideal circumstances: this makes the caregiver central to a successful husbandry program. The program will express a number of features. It will demonstrate our view of homo-centricity and how much caregiver interaction we view as beneficial and necessary to the captive gorilla. It will show whether we believe the personalities, social behavior and environmental niches of the wild gorilla to be truly representative of the genetic tendency of all gorillas. It will convey our attitudes towards the needs of the gorilla in relation to organizational effectiveness. Overall, the gorilla/caregiver relationship will ultimately express our individual and collective attitudes of humanity as guardians of the gorilla versus humanity as controller.

**Gorilla/Keeper Relationship**

By Violet Sunde
Woodland Park
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Zoo gorillas are keenly aware of their captive condition. Gorillas share almost 98% of their DNA with humans and are highly intelligent, individual, emotional and psychologically complex beings. Even in the best zoo environments, captivity imposes unnatural stresses that would not be endured in the wild state. Major among these pressures is the fact that their lives are controlled day in and day out by humans. It is not to suggest that the wild is Utopia; however, there is a great difference in the degree of self-determination between the wild and captivity. In the wild, gorillas decide when, where and what they eat, where they sleep and who they live with.

Along with cohesive social groups, spacious natural enclosures, satisfying complete nutrition, harmonious relationships between gorillas and keepers are of the utmost importance. Captive gorillas are less stressed, more stimulated and easier to manage if they have close and trusting relationships with their keepers. These relationships need to be healthy ones of mutual respect and not of over-dependency and/or over-control. Ideally, there are at least four to five keepers working regularly with the gorillas with whom they are very compatible. This arrangement allows flexibility, prevents keepers from becoming overburdened and avoids the gorillas becoming too dependent on just one or two people. It is important for younger keepers to work with gorillas and to train with more experienced keepers, thus providing continuity in the gorillas' lives.

The gorillas' potential for good health, contentment, reproduction and longevity will be enhanced if they feel good about their captors. These relationships need to be nurtured daily by time spent with each individual gorilla as well as time spent in proximity to the entire group during group feedings and observation of group interaction. Ideally, the gorillas are individually separated for a brief period twice a day and are hand fed some of their favorite food items. This time reinforces a positive relationship between gorilla and caretaker, making separation easier when it becomes necessary for illness, immobilization, breeding programs and transfers. It is also important for there to be some play between gorillas and keepers to create a more relaxed atmosphere for both.

Without human socialization, infants that are mother-reared in a group are potentially more stressed by zoo management routines and are more difficult to manage than are wild captured or hand-reared gorillas. Infants can be socialized along with their mothers through bars. Providing for the infant an option (and its mother the option of allowing it) to come out with the keepers for socialization is beneficial.

**Intervention such as giving**
medication and supplement feeding an infant while it remains with its mother will be more easily accomplished by keepers who have consistently nurtured their relationships with the gorillas. The onset of illness, both physical and psychological, will be more readily recognized by a caregiver who knows the gorillas well. Gorillas are more likely to be open and indicate how they are feeling to someone with whom they have an emotional bond. Breeding programs require potentially traumatic changes such as separation from a family group, long distance transfers, and introduction to new animals. These events can be softened by familiar keepers participating in the transitions, thus increasing chances for success while lessening the changes of illness and injury. As much as possible, it is important for keepers to gradually change routines to accustomed the gorillas to upcoming changes in their lives.

Ideally, the gorillas’ daily routine is relaxed and moves at a gorilla-like pace. Keepers need to allow gorillas as much choice and control over their own lives as possible. Often, in a tense situation, playing with the gorillas or giving them some favorite food before a desired behavior is accomplished, relaxes them and ultimately encourages cooperation. Most management routines can be accomplished in a positive manner if the keeper is allowed time to think through and try various options. As gorillas are empathetic and will be affected by the emotional state of their caregiver, keepers need to be relaxed and not over-worked or over-stressed. Time to be with the gorillas to observe and think about them are activities that need to be acknowledged for their importance. Zoo managers must defend the close relationship between keepers and gorillas and be supportive of these working requirements in order to maximize overall success. Effective management decisions require input from keepers who know the gorillas best. Keepers who intimately know the gorillas under their care can reliably and courageously represent their best interests.

Zoos promoting close relationships between gorillas and keepers have had significant breeding success, which includes mother rearing. At Howlett’s Port Lympne, gorilla keepers enter the enclosures with the gorillas on a regular basis. Certainly there are other reasons for their success, such as numbers of animals, diet and interesting enclosures. However, it is likely that the close relationship with keepers has contributed to a lower anxiety level in the gorillas. Keepers do not have to enter the gorillas’ space to have a close relationship, although if it can be done safely, it would be worth considering.

As captive management becomes more progressive, perhaps keepers can distance themselves and allow the gorillas more freedom in managing their own lives. In the future, it may be possible to release several groups into large preserves where their lives could progress with a minimum amount of interference. If the time ever comes that captive gorillas could be released to the wild, certainly a less managed program would be necessary for the transition. With improved care, gorillas are beginning to recover from the traumas of their initial captures and years of misunderstanding and mismanagement in zoos. As captive generations become healthier and more like wild gorillas, there will be the possibility of repopulating them to indigenous areas. To whatever degree they are managed, it is critical they feel unpressured by humans. When making life decisions for the gorillas, keepers and managers need to do so with knowledge, respect and compassion for the individual, the group and the gorilla culture. The caregiver must develop a sensitivity for these magnificent beings and a willingness to learn from them.

Gorilla/Keeper Relationship

By Frans Keizer
Apenheul
21 -31 Wilsannah
Apeldoorn, Holland

The development of a relationship with a gorilla is based on mutual trust and depends very much on the attitude of the keeper. Naturally, every keeper has their own definition of the word “relationship”, which will be of consequence to the way he/she takes care of gorillas. One has to bear in mind that the animal(s) entirely depend on the care of the keeper, which does not mean that the keeper should have total control over the animal(s). He/she has a certain status to be able to work with the animals, but there also has to be a certain respect; gorillas are wild animals with their own species-specific behavior and also in captive environments, they should be given the possibility to maintain that behavior. The relationship which a keeper forms with the animal(s) depends on a variety of factors all connected; knowledge, and understanding of the species (natural environment, natural behavior, group behavior, diet); the institution’s philosophy and the rules they provide (housing, diet); the keeper’s attitude (interest, behavior, care); and, of course, the gorilla(s).

The intention of a relationship is to be accepted by the other species, which can be very important in case of complication (illness and medical treatment, support during maternal care). When a keeper takes care of only one gorilla, the relationship of course is quite intense, but should be focused on how to prevent the animal from boredom. In case of a large group (10/15 individuals), the relationship takes a different approach. The keeper should realize that the mutual group relation becomes a prominent factor so its prudent he/she takes a step back. Naturally, a group of gorillas has its own order appointed by the silverback. This means there is always an individual at the bottom. In those groups, occasional quarrels concerning ranking sometime reaches the level where the keeper walks a thin line when to interfere. His/her responsibility is to keep the animals safe and sound, but he/she also has to keep focused on the relationship between cause and effect. In those occasions, his/her decision should not be colored by human sentiment, but he/she has to try to think gorilla-wise, realizing that the life of gorillas can be tough sometimes.

*This is my personal opinion based on personal experience.
A Sampling of Gorilla Diets from Around the Country

Milwaukee County Zoo
Sam LaMalfa

The Milwaukee Zoo has a total of seven gorillas in two groups. Group 1 consists of 2.3 or one adult male, one three-year-old male, two adult females and one two-and-a-half-year-old female. Group 2 consists of 1.1, both are adults. We use straw for bedding.

Our gorillas are fed two meals (morning and evening) daily. Several times during the day they receive, in groups, sunflower seeds and peanuts scattered on the ground, air-popped popcorn, cereal and browse. This breaks up their day between the two regular meals. Fluids are given three times a day. Juices may be mixed with each other or given straight. Juices are watered down. Skim milk is offered at breakfast meal. At times when caterers have leftovers from after hours events, we may get boxes of fresh veggies like cauliflower, broccoli, etc.

For the main a.m. meal and main p.m. meal, the gorillas are separated to avoid fighting over food and to control individual diets for individual animals. The adult males and one female are dominant animals and get aggressive during meals. The subordinates are allowed enough time as it requires to consume their meals without intimidation. Otherwise, the gorillas are in groups. (Amount of food per animal depends on size and age.)

Daily Food Items:
Hills high fiber monkey pellets, lettuce, celery, carrots, sweet potatoes (both raw and boiled), bananas, oranges, apples, grapes, sunflower seeds, peanuts.

Occasional Food Items:
Tomatoes, boiled eggs, boiled rice, cantaloupe, raisins, kiwi, onions.

Treats:
Spectrum banana flavored monkey chow (we use this primarily for some of our monkeys), air-popped popcorn, browse (in season willow, mulberry, etc.), cereals (corn chex, rice chex, wheat chex, cherios), yogurt.

Fluids:
Skim milk, orange, pineapple. apple juice. Each animal receives one chewable (children's) vitamin daily.

Columbus Zoo Gorilla Diet
Columbus, Ohio
Charlene Jendry

The Columbus Zoo has 16 gorillas ranging in age from 10 months to 37 years.

Adult Male Diet:
AM
1 banana
1 grapefruit
1 apple
1 cooked sweet potato
1/2 head lettuce
2 carrots
1/2 cucumber
4 flowers of broccoli
1/2 turnip

PM
1 orange
1 lemon or lime
1 cooked sweet potato
1 to 2 heads endive
2 carrots
1/2 cooked onion
4 flowers of broccoli
1/2 turnip
3 celery stalks
Handful of green beans
Handful of grapes

Other scattered food given daily (enough for two gorillas):
1 scoop popcorn or dry cereal mix
1 scoop monkey chow
1/2 scoop parrot seed (mix with dried fruit mix several times weekly)

Daily vitamins:
1 Vitamin C tablet (chewable)
1 Mazuri vitamin supplement
8 oz. warm cranberry apple fruit juice

Other foods given when in season:
pumpkin, pineapple, coconuts, watermelon, roses, papaya, tomatoes, strawberries, blueberries, and cantaloupe.

Additional information:
Three times a week a protein drink is given to each gorilla. See recipe at the end of this article.

Five times a week browse is given to animals. Grass hay is used for bedding, one bale for two gorillas.

Strawberry or pineapple yogurt, frozen fruit, frozen fruit juices, and fresh fruit are favorites for the gorillas.

Toys the gorillas prefer are boomer balls, tool stations, ropes, fire hoses, climbing structures, buckets, tubs, fabrics, burlap bags, branches and tires.

Columbus Zoo Protein Drink:
In a 2 quart blender add:
8 oz. yogurt
1 banana (or any fruit)
2 heaping T protein powder
2 heaping T bone meal
1/4 C blackstrap molasses
1/4 C liquid lecithin
2 heaping T powered brewer's yeast
1 heaping T peanut butter
5 400 IU vitamin E caps
1 C cranberry juice
2 heaping T wheat germ

Gradually add water and blend until liquid (until the blender is filled). Pour 8 oz. of mixture into a 16-oz. glass and add an additional 8 oz. water per adult. Juveniles receive half portions, 4 oz. of mix with 4 oz. water or milk. Serve 3x per week. Serves 8 adult gorillas.

Little Rock Zoo
Bruce Roberts

The Little Rock Zoo has two exhibits of gorillas consisting of 3.1 and 1.1. Bedding is provided in the forms of hay, straw or shredded paper. The hay is occasionally eaten.

Male Diets:

AM
2 apples
1/2 to 1 garden produce (usually eggplant, cucumber or turnip)
8 oz. low fat milk (5 days/week)

PM
4 apples
2 heads romaine
3 bananas
1/2 sweet potato
2 carrots (4 days/week)  
1 orange (4 days/week)  
1/2 bunch celery (4 days/week)  
1/2 to 1 garden produce (usually tomato, bell pepper, onion or squash)  
*1 hard-boiled egg, de-yolked (1 day/week)  
3 oz. live-culture yogurt (2 days/week)  
*1/2 loaf of bread  
1 peanut butter and vitamin sandwich (2 days/week)  
*8 cups HMS monkey chow

Female Diets:

AM  
1 apple  
1/2 garden produce (usually eggplant, cucumber or turnip)  
8 oz. lowfat milk (5 days/week)

PM  
2 apples  
1 head romaine  
2 bananas  
1/2 sweet potato  
1 carrot (4 days/week)  
1 orange (4 days/week)  
3 stalks celery (4 days/week)  
1/2 to 1 garden produce (usually tomato, bell pepper, onion or squash)  
*1 hard-boiled egg, de-yolked (1 day/week)  
2 oz. live-culture yogurt (2 days/week)  
*1/2 loaf of bread  
1 peanut butter and vitamin sandwich (2 days/week)  
*4 cups HMS monkey chow  
* is adjusted to individual diet needs

Forage Items Placed on Exhibit:  
Parrot mix (3 days/week), peanuts (3 days/week), popcorn (6 days/week), frozen mixed vegetables (3 days/week), raisins (3 days/week), canned pineapple tidbits (2 days/week), fruit cocktail (2 days/week), HMS monkey chow (7 days/week), romaine (7 days/week).

Browse provided 1 to 4 times per week. Foods grown in the exhibit and readily available in season include: dewberries, millet, pumpkins, corn, willow, hackberry, dwarf bamboo, clovers, vetch, cat-tails, peanuts, sweet potatoes, native grapes and sweet gum.

Omaha’s Henry Doorly Zoo  
Corrine Brown D.V.M.

Our information is probably not very helpful right now, as we are undergoing a diet change. Essentially, we are adding browse and more leafy vegetables and removing fruit. We are hoping to phase out oatmeal patties (which were developed for an animal we no longer have - he was allergic to monkey biscuits) and adding monkey biscuits.

We currently house 2.1 gorillas: 1.0 ten year old (Mosuba), 1.0 eight year old (Tubby), .1 thirty year old (Benoit)

We use no bedding regularly and use prairie hay occasionally for enrichment.

Lowland Gorilla  
Standard diet for Benoit:  
2 apples  
2 oranges  
1 egg  
8 oz. prunes  
1 oatmeal patty  
.7 lb. monkey chow/day

Comments:  
APS - Medicates twice each day. Each treatment consists of:  
*peri dos syrup (casantranol and dosucate sodium) - 2 ts.  
ex lax - 5 pills  
mitrolan (calcium polycarbophil) - 5 tablets  
tetracycline - 500 milligrams

Juvenile diet (for 1.0 gorilla):  
3 apples  
2 oranges  
3 bananas  
2 carrots  
1 bunch celery  
1 potato  
1 egg  
1 oatmeal patty  
1 chewable multi-vitamin supplement  
1.4 lb. monkey chow

Comments:  
2.0 animals (Tubby and Mosura) are fed together.

Oatmeal Patties:  
In a large bag place:  
16 scoops* rolled oats  
8 scoops* solk floc  
In a separate large bag place:  
6 cups raisins (two bags)  
8 cups sunflower seeds (shelled)

Place contents of both bags in mixer along with 3 bunches of peeled bananas. Mix a few times.

In a large pan place:  
1 box corn starch  
4 cups fructose  
7 1/2 blenders full of water - hot

Mix well and heat on stove until boiling. Mix and place into mixer with dry ingredients. Mix well. Form patties and place on "baking sheets". When completed, place on shelf in apple cooler.  
*1 scoop = 32 oz.

Zoo Gulf Breeze  
Linda Pastorello  
Head Primate Keeper

The gorilla troop at the Zoo Gulf Breeze consists of an adult female (age 29) and two juveniles (both age 7). Their a.m. diet is fed spread throughout the exhibit with all three having access. Their p.m. diet is given in individual bowls with the adult female separated from the two juveniles. In the inside night cages, the gorillas are given empty feed bags to nest in. The outside exhibit is planted with grass and no bedding is used.

AM  
1 scoop (approximately 150 pieces) of either monkey chow or leaf eater diet  
6 pieces of fruit (varies from day to day)

PM  
0.1 Adult:  
2 fruits  
1 green  
1 dinner item

1.1 Juveniles each:  
3 fruits  
2 green  
15 pieces monkey chow  
1 dinner item

Dinner Items:  
Carrot salad - carrots and raisins mixed in yogurt  
Cooked chicken leg  
Oatmeal - sometimes cooked with fruit pieces  
Cooked canadian peas or corn  
Egg salad (mashed eggs and yogurt)  
Corn bread - rice, beans, banana, cornmeal and kale all baked

(Continued on page 16)
Rice bake - rice, caro-syrup and raisins baked together
Macaroni salad - macaroni, carrots, raisins and yogurt
Cooked rice with fruit pieces
Baked apples stuffed with raisins
Hard-boiled eggs
Anything else our dietitian whips up

In the afternoon

Summer: Each get a frozen flavored water treat with pieces of fruit frozen within.

Winter: Get something thrown into exhibit to forage - sunflower seeds, popcorn (no butter or salt), peanuts, etc.

National Zoological Park
Washington, D.C.
Rob Shumacher

Example of a 1.0 diet:
Chow 24 oz.
Kale 20 oz.
Celery 16 oz.
Beans 16 oz.
Carrots 16 oz.
SWT POT (Raw) 16 oz.
Apple 14 oz.
Orange 14 oz.
Banana 16 oz.
Meat (SAT) 6 oz.
Veg du jour 6 oz.
Egg - 1

Example of a 0.1 diet:
Chow 14 oz.
Kale 14 oz.
Celery 14 oz.
Beans 14 oz.
Carrots 14 oz.
SWT POT (Raw) 14 oz.
Apple 12 oz.
Orange 12 oz.
Banana 12 oz.
Meat (SAT) 8 oz.
Veg du jour 6 oz.
Egg - 1

There are a few details I should add:

We use three types of chow; Purina 5045, High Fiber Primate Diet 7021 from HMS in Bluffton, Ind. and Leaf Eater Food (Gorilla Size) from Marion Zoological in Plymouth, MN. Almost all of the gorillas refuse to eat the Leaf Eater, but we offer it occasionally.

We consider browse to be part of the normal diet and it is offered daily. I’ve included a list for your of the types we have in the park. The most frequently offered because of abundance in the park are maples, mulberry, boxelder and bamboo.

You’ll notice veg du jour on the diet cards. We rotate a different item on a daily basis. Some of the most popular are coconut, cucumber, grapes, watermelon, beets, parsley, bok choy, romaine, boiled beef, baked fish, pumpkins, corn on the cob, hard boiled eggs, turnips and squashes are offered but are not very popular.

We also provide a variety of forage foods during the day: air popped popcorn, bird of paradise mix, alfalfa pellets, raw peanuts (shelled), sunflower seeds, nuts occasionally, cereals like shredded wheat occasionally.

We have nine gorillas split into 1.1 and 4.3. We use a timothy hay blend that is grown locally for bedding.

Los Angeles Zoo
Gorilla Diets
Jennifer J. Chatfield

AM Inside:
Per gorilla: 1 qt. non-fat milk, 1 apple, 1 orange, 1 handful peanuts and 1/2 scoop old world monkey chow (Mazuri)

AM On exhibit:
3 cups hullled sunflower seeds, per exhibit and one piece browse per animal. Various enrichment items in small amounts (i.e., dry cereal, soaked monkey chow, oatmeal, sugar-free preserves)

Mid-day. On exhibit:
Lettuce, carrots, monkey chow, cabbage and yams.

Total gorillas at the L.A. Zoo 5.5.0
For each stall in the holding area, 4 burlap sacks are used for bedding, these may be taken out into the exhibit by the gorillas, and used for play objects.

Evening Inside:

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Chris</th>
<th>Kelly &amp; Cléo</th>
<th>Sandy</th>
<th>Tzambo</th>
<th>Evelyn &amp; Jim</th>
<th>Rapunzel</th>
<th>Angel</th>
<th>Cosa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lettuce</td>
<td>3 heads</td>
<td>4 heads</td>
<td>2 heads</td>
<td>2 heads</td>
<td>3 heads</td>
<td>1 head</td>
<td>1 head</td>
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<tr>
<td>Broccoli</td>
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<td>1 stalk</td>
<td>1 stalk</td>
<td>2 stalks</td>
<td>1 stalk</td>
<td>1 stalk</td>
<td>1 stalk</td>
</tr>
<tr>
<td>Celery</td>
<td>1/2 head</td>
<td>1/2 head</td>
<td>1/2 head</td>
<td>1/2 head</td>
<td>1/2 head</td>
<td>1/2 head</td>
<td>1/2 head</td>
<td>1/2 head</td>
</tr>
<tr>
<td>Squash</td>
<td>small pc.</td>
<td>————&gt;</td>
<td>————&gt;</td>
<td>————&gt;</td>
<td>————&gt;</td>
<td>————&gt;</td>
<td>————&gt;</td>
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<tr>
<td>Yams</td>
<td>2-4</td>
<td>4-6</td>
<td>3-4</td>
<td>4-6</td>
<td>3-4</td>
<td>3-4</td>
<td>4-6</td>
<td>————&gt;</td>
</tr>
<tr>
<td>Cooked homestead</td>
<td>small piece</td>
<td>————&gt;</td>
<td>————&gt;</td>
<td>————&gt;</td>
<td>————&gt;</td>
<td>————&gt;</td>
<td>————&gt;</td>
<td>————&gt;</td>
</tr>
<tr>
<td>Hard-boiled egg</td>
<td>1/2 wk</td>
<td>————&gt;</td>
<td>————&gt;</td>
<td>————&gt;</td>
<td>————&gt;</td>
<td>————&gt;</td>
<td>————&gt;</td>
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<tr>
<td>Apples</td>
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<td>4</td>
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<tr>
<td>Oranges</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>6</td>
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<tr>
<td>Bananas</td>
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<td>4</td>
<td>4</td>
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<tr>
<td>Grapes</td>
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<td>Carrots</td>
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<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
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<tr>
<td>Corn on the cob</td>
<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
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<td>1/2</td>
<td>1/2</td>
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<tr>
<td>Shells</td>
<td>2</td>
<td>4</td>
<td>2</td>
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Calgary Zoo
Gorilla Diets
Rob Sutherland

Tabitha - 0.1, lactating
Calories Required = 2,941

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<tr>
<th>DIET DESCRIPTION</th>
<th>AMOUNT</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>T</th>
<th>F</th>
<th>S</th>
<th>S</th>
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<tr>
<td>PRIMATE CHOW HI-FIBRE</td>
<td>3 1/2 CUPS</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>ORANGES</td>
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<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>GRAPEFRUIT</td>
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<tr>
<td>CARROT</td>
<td>1</td>
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<td>X</td>
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<td>LEMON</td>
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<td></td>
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<td>TURNIP</td>
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<td></td>
<td></td>
<td>X</td>
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<tr>
<td>POTATO</td>
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<td></td>
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<td></td>
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<tr>
<td>BARLEY/WHEAT SPROUTS</td>
<td>1 CUP (500gm)</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>BROWN RICE</td>
<td>1/2 CUP COOKED</td>
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<td>X</td>
<td>X</td>
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<tr>
<td>APE JUICE</td>
<td>1 CUP</td>
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<td>X</td>
<td>X</td>
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<td>X</td>
<td>X</td>
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<tr>
<td>ONION</td>
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<td>X</td>
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<td>X</td>
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<tr>
<td>CELERY</td>
<td>1 HEAD</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>BANANA</td>
<td>2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>10% OCCUPATIONAL FOODS</td>
<td>(10% of calories required above)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>LETTUCE</td>
<td>2 HANDFULL</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

SUPPLEMENTS
----------

| WESTCAN VITAMINS | 1 | X | X | X | X | X | X | X |
| BROWSE           | FREE CHOICE | X | X | X | X | X | X | X |

SPECIAL INSTRUCTIONS
---------------------

CHECK WATERERS FREQUENTLY

USE FOOD CHART TO DETERMINE OCCUPATIONAL FOOD AMOUNTS (10% OF CALORIE REQUIREMENT)

FEED APE JUICE SEPERATE FROM TROOP AND OTHER FOODS

MAXIMIZE DIETARY VARIATION AT ALL FEEDINGS

4 FEEDINGS: 1) SEPERATE A.M. 2) MAJOR A.M. 3) OCCUPATIONAL P.M. 4) MAJOR P.M.

ADVISE KEEPER/VETERINARIAN OF ANY CHANGE IN FOOD INTAKE

MAKE SURE ALL BROWSE AND OCCUPATIONAL FOODS HAVE NO TOXIC EFFECT DO NOT OVERFEED!
### Occupational Food Examples:

**Fruits:**
- apples
- apricots
- avocados
- bananas
- blackberries
- blueberries
- cherries
- coconuts
- cranberries
- dates
- figs
- frozen fruits
- fruit juices
- grapefruits
- grapes
- kiwi fruits
- lemons
- mangos
- melons, cantaloupe
- melons, honeydew
- melons, water

**Vegetables:**
- nectarines
- oranges
- papayas
- peaches
- pears
- persimmons
- pineapples
- plums
- prunes
- pumpkins
- raisins
- raspberries
- squash, acorn
- squash, butternut
- squash, generic
- squash, spaghetti
- squash, yellow
- squash, zucchini
- strawberries
- tangerines
- tomatoes
- ugli fruits
- other fruits

**Greens/Browse:**
- rhubarb
- rutabagas
- turnips
- vegetables, frozen-mixed

**Cereals/Grains:**
- lettuce
- parsley
- spinach
- sprouts, bean
- sprouts, soybeans
- nuts, generic
- oats, rolled
- peanuts
- peanut butter
- popcorn
- seeds, generic
- sunflower seeds
- rice, brown
- rice cakes
- rice, puffed
- rice, white
- wheat, puffed

### APE Section Daily Diet - January 1, 1994

<table>
<thead>
<tr>
<th>Gorillas</th>
<th>AM. INO.</th>
<th>AM. GROUP</th>
<th>MID</th>
<th>P.M. INO.</th>
<th>P.M. GROUP</th>
<th>OCC. CAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felix</td>
<td>2 c. ape juice 1 c. P. Chow 1A/01/94 * 1 Ce</td>
<td>2 c. P. Chow lettuce 10G/01/94</td>
<td>Occ/browse</td>
<td>3/1/10/18</td>
<td>2 c. Mt. sprouts 1 c. rice 1 G/01/94</td>
<td>480</td>
</tr>
<tr>
<td>Julie</td>
<td>1 c. ape juice 1 c. P. Chow 1A/01/94 * 1 Ce</td>
<td>2 c. P. Chow lettuce 10G/01/94</td>
<td>Occ/browse</td>
<td>1A/10/18</td>
<td>1 c. sprouts 1/4 c. rice 1/2 G/01/94 On Occ/browse</td>
<td>325</td>
</tr>
<tr>
<td>Tasha</td>
<td>1 c. ape juice 1 c. P. Chow 1A/01/94 * 1 Ce</td>
<td>2 1/4 c. P. Chow lettuce 10G/01/94</td>
<td>Occ/browse</td>
<td>1A/10/18</td>
<td>1 c. sprouts 1/4 c. rice 1/2 G/01/94 On Occ/browse</td>
<td>300</td>
</tr>
<tr>
<td>Dancey</td>
<td>1 c. ape juice 1 c. P. Chow 1A/01/94 * 1 Ce</td>
<td>1/4 c. P. Chow lettuce 10G/01/94</td>
<td>Occ/browse</td>
<td>1A/10/18</td>
<td>1 c. sprouts 1/4 c. rice 1/2 G/01/94 On Occ/browse</td>
<td>225</td>
</tr>
<tr>
<td>Caroline</td>
<td>1 c. ape juice 1 c. P. Chow 1A/01/94 * 1 Ce</td>
<td>1 c. P. Chow lettuce 10G/01/94</td>
<td>Occ/browse</td>
<td>1A/10/18</td>
<td>1 c. sprouts 1/4 c. rice 1/2 G/01/94 On Occ/browse</td>
<td>300</td>
</tr>
<tr>
<td>Mundu</td>
<td>1 c. ape juice 1 c. P. Chow 1A/01/94 * 1 Ce</td>
<td>2 c. P. Chow lettuce 10G/01/94</td>
<td>Occ/browse</td>
<td>1A/10/18</td>
<td>1 c. sprouts 1/4 c. rice 1/2 G/01/94 On Occ/browse</td>
<td>300</td>
</tr>
</tbody>
</table>

### Code

- A = apple
- O = orange
- B = banana
- On = onion
- C = carrot
- Ce = celery
- Occ = occupational
- * = Tue/Fri/Sun

10 = 1/2 grapefruit
1 = 1 lemon
1C = 1/4 c. peanuts
5 o. = 5 o. popcorn

---

**Credits:**

**Gorilla Gazette Editorial Board**
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Asst. Editors: Susan Hall-White, Debbie Elder
Asst. Director of Conservation and Education: Don Winstel
Docent Representative: Dotty Henderson
Layout and Design: Jennifer Amorose Jakse

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Gorilla Gazette is published by the Great Ape staff of the Columbus Zoo,
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DON'T FORGET

DeadlineDeadlineDeadline

The deadline for articles for the next issue of the Gorilla Gazette is April 1, 1995.