Coe, Jon C. & Maple, Terry L. 1984, "Approaching Eden: A Behavioral Basis for Great Ape Exhibits" in *AAZPA 1984 Annual Conference Proceedings*, American Association of Zoological Parks and Aquariums, Wheeling, WV, pp. 117-128.

Historical Note: Not since Robert Garner's 1914 statement that zoo gorillas should have "their own jungle" has there been a clearer call to make nature the model in zoo great ape facilities. This paper gave voice to a renaissance in great ape facility design that continues to this day. Jon Coe, 2006.

Approaching Eden: A Behavioral Basis for Great Ape Exhibits

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Eden: ***The garden of species genesis.*** (Authors' definition)

The Fall from Paradise

The great apes have fallen from Eden. Its trees have been cut down around them. Where once they inhabited a seemingly endless Miocene paradise a few now persist in a tatter of relic forests under constant siege. Certainly the most visible representatives of these remote populations are found in our zoos.

Some would compare our zoos to an ark, a safe and comfortable haven for zoological refugees, but many great ape exhibits more closely resemble hospital ships or prison barges. Great apes are often kept like felons or window displays, caricatures of their wild cousins, condemned to severe intellectual and social poverty.

Over the last several decades, enclosures have been largely modeled after animal laboratories, where hygiene and security are the dominant design criteria. While these factors are of great importance in dealing with powerful, valuable and often volatile creatures, these lab-like exhibits have serious drawback.

1. They demonstrate little about the animals' natural ecology or behavioral or physiological adaptations.
2. They tend to encourage an anthropomorphic view by spectators.
3. They limit the animals' choices of activities and social interactions which may induce continuous low levels of stress or nearly pathological boredom or both.
4. They do not allow a natural range of intra-group, inter-group or inter-specific behaviors.

Perhaps the greatest difference between wild and captive existence is in the diversity of experience available to the animals. In human society we consider solitary confinement one of the most severe punishments, but even today, it is not unusual to see our closest anthropoid relatives lead a solitary existence directly comparable to imprisonment.

Scientists in Eden

When compared to their brief history in zoos, great apes have done quite well on their own for the last several million years. Recently, scientists such as Schaller, Fossey, Goodall, Gladikas and others have spent years monitoring behavior in Eden. They have learned many things which could be applied to zoo design.

Animal interactions with the Natural Habitat

Many natural behaviors are stimulated by or are interactive with natural objects or features. For example great apes commonly make day and night nests. Woodland Park Zoo, in an attempt to provide for this need, has built resilient sleeping surfaces and provided straw bedding. Lincoln Park Zoo built basket-like perches on their steel pipe climbing structures. While not flexible or resilient, at least these structures are well off the floor.

Water is a common element in the moist tropics. In the wild, most gorillas and chimpanzees tend to avoid streams and water bodies (Fossey 1983, Goodall 1971) but a few captive great apes seem to enjoy water (Brown, et al 1982). Gorillas and chimpanzees have drowned in water moats but evidence also suggests that in these cases their first water experience was unfortunately also their last. Drowning does not seem to occur among great apes who grew up in the vicinity of water and experimented with it as adolescents. Whether used by the animals or not, water features do add diversity and interest to exhibits. At the last, they are objects to leap or climb over and at best, can provide hours of amusement for the apes.

Termite mounds are well known centers of chimpanzee interest. Several zoos including the Tama Zoological Park in Tokyo (Yoshihara 1979) and the North Carolina Zoological Park have built artificial termite mounds which allow chimps to probe for honey, fruit juice or mustard with stick tools of their own construction.

Hillsides in Arica are used by gorillas and chimps for a wide variety of activities including sunning and playing. Animals may take to higher ground to enhance a threat stance or rush downhill in a terrifying display. Silverback gorillas often station themselves on higher ground to survey their domain. Fossey (1983) describes a steep ravine that formed the territorial boundary between rival mountain gorilla groups. The contending silverbacks, supported by lesser males, would face off on opposite sides of the ravine and engage in elaborate and often deafening displays of intimidation and territorial defense.

Gorillas and chimpanzees are both known to enhance their threat displays by shaking or throwing vegetation or other objects. In addition, chimps use hollow logs and tree buttresses as drums (Goodall 1971). Some zoos provide man-made substitutes such as beer kegs and tires, but these give the impression that the animals are loose in a wrecking yard.

Climbing is a play activity common to all great apes including humankind. Climbing is also used for food gathering and as a means of territorial display, particularly among adult male orangutans. There are obvious differences between climbing structures in the wild and in the zoo.

1. Zoo climbing apparatus tends to be static, rigid and of limited size and variety. Playground equipment is often used, thus presenting the animals in an extremely anthropomorphic setting. The abundant use of large ropes at the Lincoln Park Zoo and the San Diego Zoo, and the use of artificial lianas at the Brookfield Zoo represent a great improvement. Climbing apparatus should also be used to dispense food.
2. Wild great apes can climb as high as interest and trees allow. Indeed, orangutans seldom descend to the ground at all if arboreal routes can be found. Although 450 pound silverbacks were thought not to climb, Kiki, Woodland Park Zoo's male frequently climbed to a height of 40 feet or more. Similar behavior has been commonly seen at the San Francisco Zoo and at Apehnheul in Holland (Maple & Hoff 1981). Better ways must be found of protecting trees while allowing ape access.

Inter-Group Behavior in Gorillas and Chimpanzees

A few of the best great ape exhibits provide a somewhat isolated version of Eden. The gorilla exhibit at Woodland Park Zoo and the chimpanzee enclosure at the North Carolina State Zoo provide large habitats most resembling the species' native landscape. This is an excellent beginning and it is hoped that better exhibits will follow. But what is the next step? Both Dr. Fossey (1983) and Dr. Goodall (1984) report dramatic and sometimes violent encounters between groups of gorillas or chimpanzees. These encounters appear to be the most exciting events in the animals' lives. Many adaptations, such as the massive size and silver hair of the adult male gorilla can be explained by these encounters. Is it possible that such encounters, with the danger of contact removed, could be stimulated in a zoo setting? Dr. Maple (1981b) speculates that adjacent placement of gorilla exhibits would allow the silverback champions from each group to participate in vigorous displays across a hidden barrier. The display encounter could develop into a strong group activity since many members of each group might join in. This type of vigorous stimulation may even improve breeding performance.

Obviously, the exhibits would have to be designed so that such encounters could also be avoided by allowing members of contending groups to stay out of each other's sight if they chose. Adjacent positioning of exhibits may also stimulate territorial defense behavior in chimpanzees. Image what an exciting experience such displays would make for zoo visitors!

[2006 Update: Zoo Atlanta did build adjacent gorilla exhibits as described above. While this facility did result in many gorilla births over the years, the territorial displays envisioned above never occurred.]

Inter-Specific Behavior in Chimpanzees

While all great apes co-evolved with many other creatures, chimpanzees seem to interact most with other species, particularly Anubis baboons. Although it is doubtful that chimps and baboons could coexist even in a large enclosure without

eating each other's offspring, they could be effectively displayed in adjacent exhibits across hidden barriers.

[2006 Update: Melbourne Zoo has successfully kept gorillas and Debrassa monkeys together and several zoos keep orangutans and gibbons together.]

Female Consorting Among Orangutans

Wild adult orangutan males lead a normally solitary existence, though they seem to tolerate group living in captivity. In the wild, adult males establish territories which they announce with long calls and posture displays in the tree tops. Females associate with their older female offspring and rear their young without male participation. When sexually receptive, adult female oranges select an adult male and consort with him during the breeding period.

The situation in zoos is often opposite to this. A pair of animals is kept together as if monogamy were the rule. A better captive arrangement would mimic the wild condition. Here the females would share a central exhibit area which would have several satellite enclosures for long males. These areas would be connected to the female enclosure by creep doors which could only allow the females to pass through. For their part, the males would likely compete in long call contest, joining adjacent gibbons in the general zoo cacophony.

A Garden of Diversity

Great ape fortunes are rapidly changing. Many new, more spacious and diverse enclosures are being built and where this is not yet possible, zoo staff are following the Basel Zoo's approach by adding soft substrate and novel items to exercise the apes' curiosity. John Aspinall, realizing that large group interactions naturally result in greatly increased intellectual and physical stimulation, is trying to increase the gorilla group size at Howletts Park.

Zoos will never be able to simulate all conditions found in virgin wilderness, nor should they. Yet the closer we come to providing enclosures which give animals maximum choices and optimal diversity, the more likely we are to provide their needs – including needs we don't even know they have! While it true that wild animals are limited by complex environmental and behavioral constraints, they do at least have freedom to act within their own behavioral norms. Too frequently zoo animals do not even have this choice.

Approaching Eden

Great advances are being made in zoo exhibit design and construction technology. These advances together with our knowledge of ape ecology, biology and behavior now enable us to build exhibits which are orders of magnitude better than most now existing. Exhibition philosophy and support lags behind design potential. The old mould of copying other zoos instead of nature has rarely been broken. It is hoped that some of the ideas presented today will redirect our view and stimulate our thinking. Perhaps our great apes, who have suffered so patiently through decades of our benign neglect, can soon be introduced into exhibits approaching Eden.

Acknowledgement: The exhibition concepts shown in the following illustrations were developed collaboratively between the authors at Georgia Tech in 1981.

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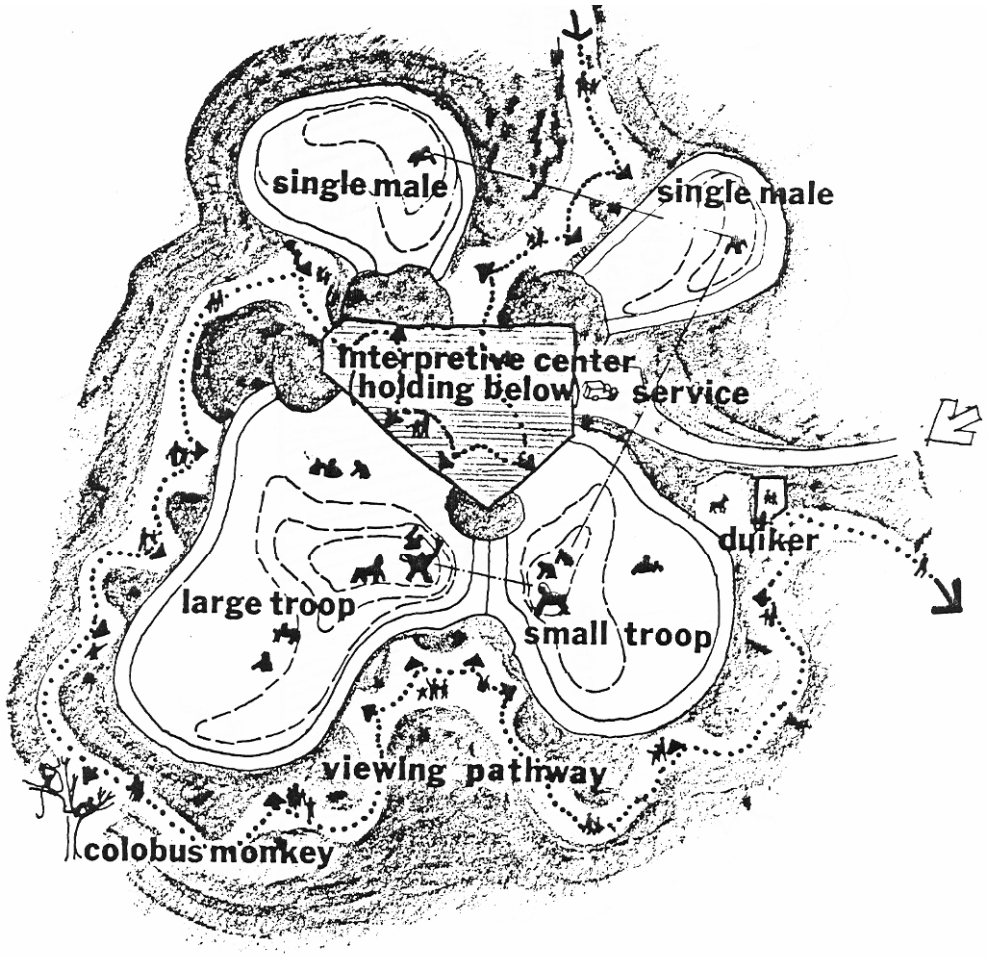

GORILLA

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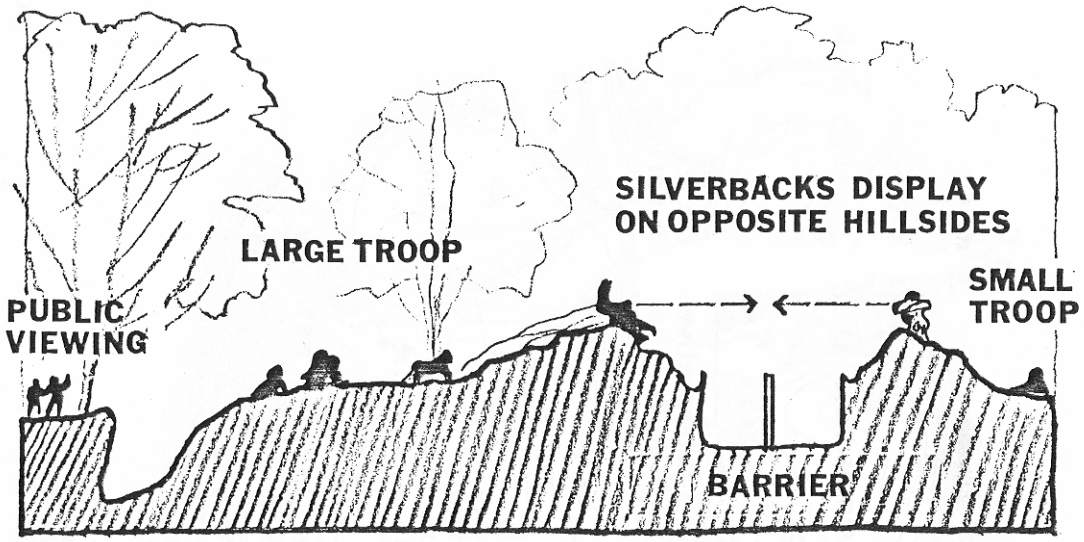

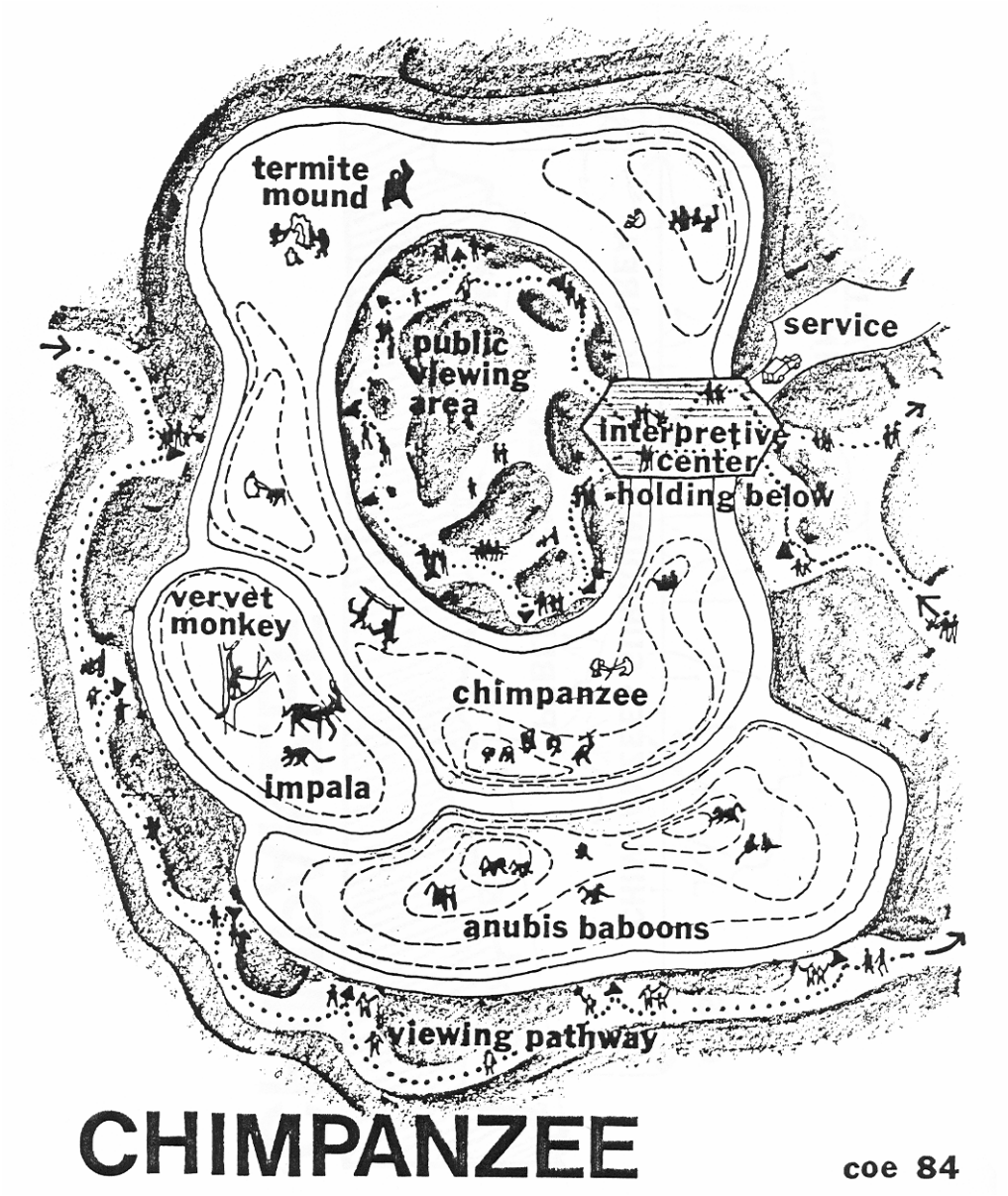
termite mound
public viewing area
service
interpretive center
holding below
vervet monkey
chimpanzee
impala
anubis baboons
viewing pathway
CHIMPANZEE
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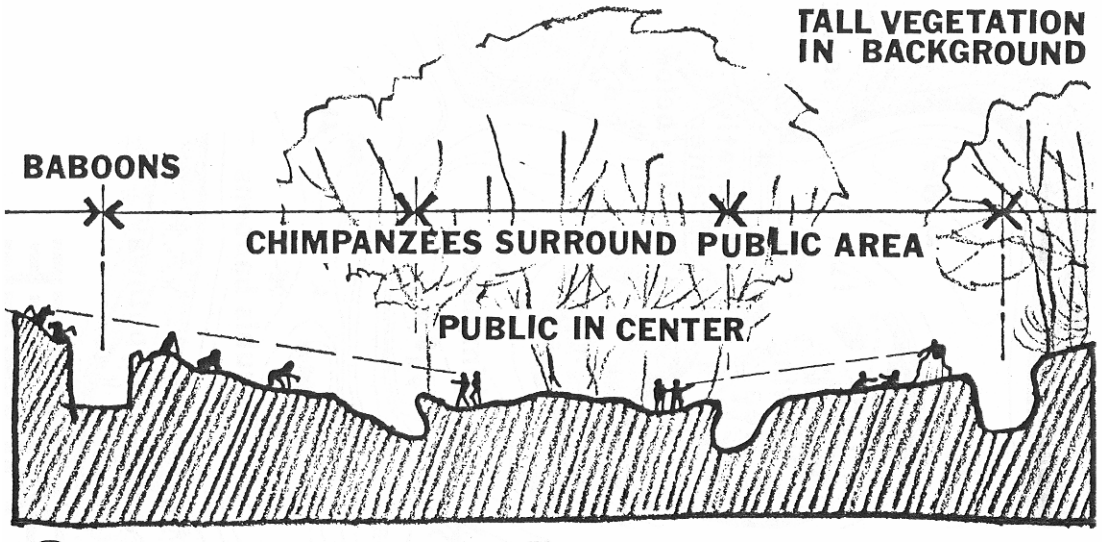
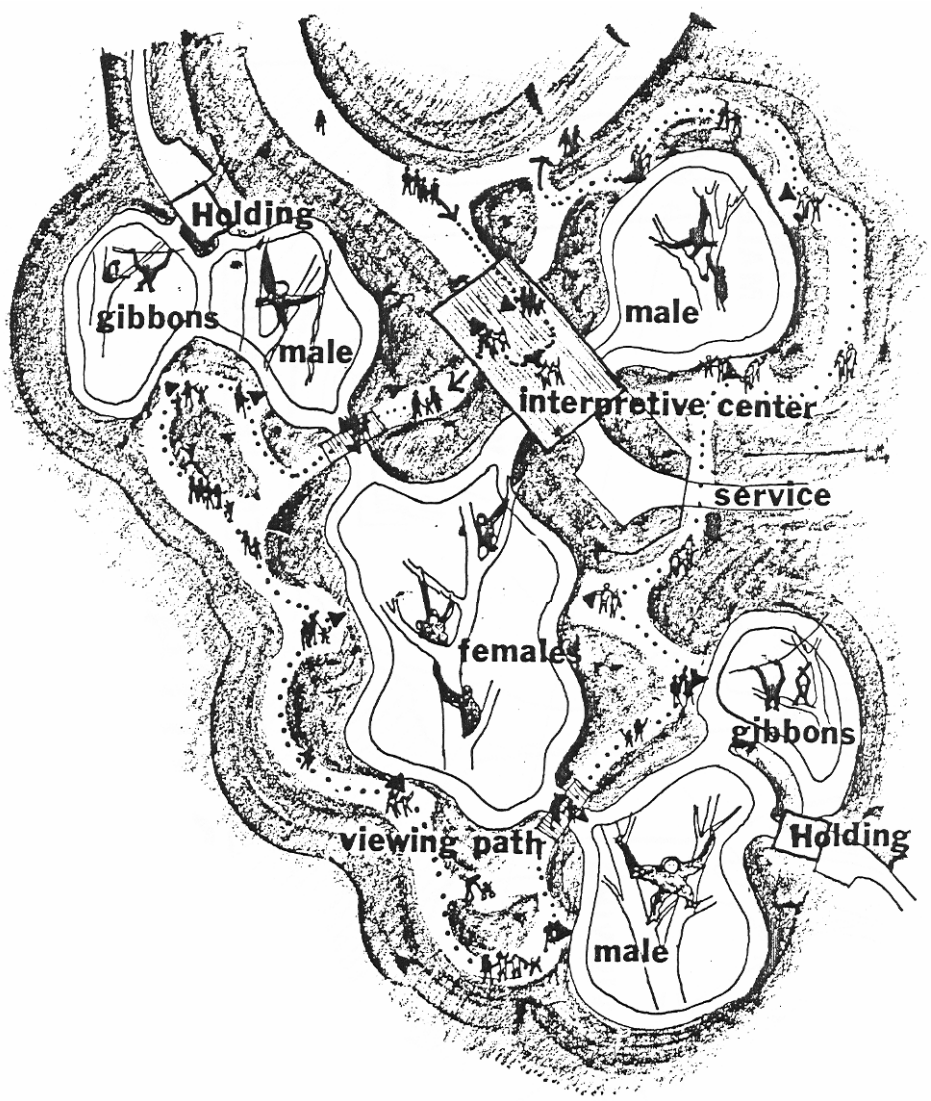

TALL VEGETATION IN BACKGROUND
BABOONS
CHIMPANZEES SURROUND PUBLIC AREA
PUBLIC IN CENTER



ORANG UTAN

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