

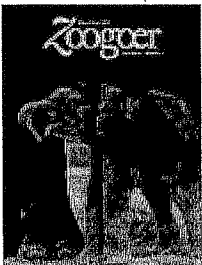
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Making Room for Elephants

by John Tidwell

On an unseasonably warm, rainy Sunday afternoon in late November last year, a little elephant was born at the Smithsonian's National Zoological Park. His birth was special, not simply because he was a cute, 325-pound baby with big dark eyes and a trunkful of attitude. Nor was it because he was the first male elephant ever born at the National Zoo, and the Zoo's first elephant birth using a unique bit of medical acrobatics. Rather, this little elephant is special because of what he is: a symbol of all that zoos are trying to achieve with wildlife today.



Kandula gained about 50 pounds in his first six weeks, perfectly normal for an Asian elephant (*Elephas maximus*). But the circumstances of Kandula's very existence—and the lives of his family members here at the Zoo—are anything but normal. Kandula was born with tremendous excitement and weighty expectations upon his furry shoulders: a brave new hope for endangered species.

The Little Prince

Kandula is at it again. Shaking his scruffy head at Zoo visitors. Pulling his mom's tail. Splashing in muddy puddles. Throwing straw at crows that intrude upon his private kingdom and generally keeping his caretakers on their toes.

"He's just all boy," reflects Marie Galloway, the head Elephant Manager and Kandula's constant companion. "He was feisty practically from the moment he was born. As soon as he hit the floor his head was up and he wanted to get up."

The Divinity Nobody Wants
 (Elephant Divinity)
 How Many Elephants Are There?



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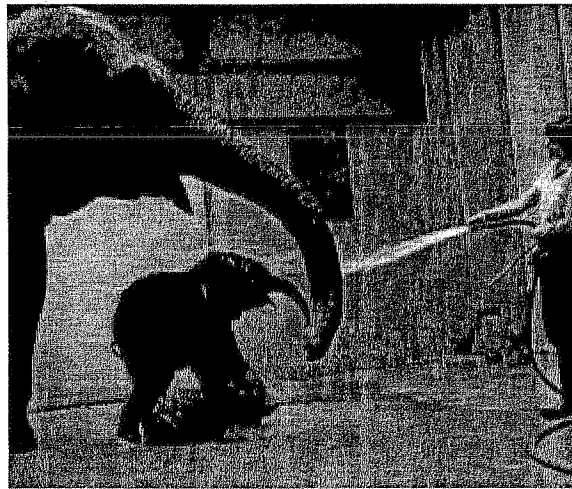
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Small and slender, with a bob of brown hair, Galloway hoists a wheelbarrow of elephant alfalfa while Kandula leisurely suckles at the breast of his mother, Shanthi. Now 26, Shanthi probably won't have any more babies. Elephant cows often get meomyomas, uterine cysts that impede pregnancy as they approach 30. But Shanthi has proved a patient and devoted mother. Quietly munching from a bale of hay, she lets Kandula play about her tree-trunk legs and make rude gestures at his two elephantine "aunts," Ambika and Toni, Shanthi's longtime roommates. Ambika, the 53-year-old matriarch, tolerates the calf with a dignified air and is always careful to stand between rascally Kandula and Toni, 33, who is nervous and sometimes unpredictably aggressive.

Both of Kandula's parents are of Sri Lankan origin, and the Sinhalese name found for him is apt, evoking indomitable courage and strength: Kandula was the name of the Royal War Elephant of the Sri Lankan King Dutugemunu (161-137 B.C.) who helped his master unite the island under his rule.



Already Kandula has become one of the National Zoo's most celebrated and cherished animals during a banner year of births that included a male western lowland gorilla (*Gorilla gorilla gorilla*), Kojo, a Sulawesi macaque (*Macaca nigra*), a Sumatran tiger (*Panthera tigris*) named Berani, and a Masai giraffe (*Giraffa camelopardalis tippelskirchi*) named Jana.

In recent years the National Zoo's veterinary staff have been pioneering the frontiers of elephant reproductive science. Kandula is one of a handful of Asian elephants born through a form of artificial insemination first explored here at the Zoo. National Zoo reproductive physiologist Janine Brown also perfected a hormone test that allowed vets to know days in advance that Shanthi would deliver early. Because of this high degree of care and expertise, Kandula's birth went largely without a hitch.

But the ease of this success belies a hard truth that zoos and circuses have struggled with for more than 100 years. For all their might and size, elephants have proved one of the most difficult species to breed. Over the past century, there have been only 132 elephants born in North America, according to American Zoo & Aquarium Association (AZA) records. Of those, 62 are alive today. The great majority of American births have occurred in the last 40 years, since a budding conservation movement began to shift zoos' focus away from

importing elephants from the wild.

When Seattle showman Morgan Berry let two of his young elephants stay at the Portland Zoo (now the Oregon Zoo) in 1962, no one realized that one of them, an Asian cow named Belle, was pregnant. In April of that year, she gave birth to a 225-pound male calf named Packy, the first American birth in 44 years. The resulting publicity vaulted Portland's zoo into the position of "world capital" of zoo elephant breeding: For the next 20 years, roughly one baby was born there per year. However, Portland's prolific pace diminished after 1976, when the Convention on the International Trade in Endangered Species (CITES) and the U.S. Fish & Wildlife Service outlawed international trade of wild elephants in order to curb the rampant global ivory trade. Suddenly U.S. zoos and circuses were limited to the small elephant population already living in North America. With elephant births rare, serendipitous events and with no access to wild stocks, U.S. zoos faced a rapidly dwindling pool of elephants.

Potential pachyderm moms and dads were widely scattered among hundreds of zoos and circuses, often living in small groups or alone. To address this problem, the AZA created a coordinated Species Survival Plan (SSP) for Asian elephant breeding in 1985. The Asian Elephant SSP authorized AZA member zoos to share their animals and record births in a studbook to track the number of elephants in the program and to whom they were related in order to maintain a diverse gene pool. But while the frequency of elephant births in American zoos had increased by the mid-1990s, nearly half of the calves born died before their first birthday. And no one knew why.

The Princess and the Plague

Kandula was not Shanthi's first baby. In 1991 the National Zoo wanted to breed Shanthi with a bull named Indy who lived at the Rosamond Gifford Zoo in Syracuse, New York. So staff decided to do what most zoos participating in the Asian Elephant SSP did at that time: They put her on a train and sent her up to Syracuse. Marie Galloway went along to keep the 8,800-pound animal calm and provide expertise in handling her. Shanthi had never seen a male before, but by November of 1992 she was pregnant and on her way home. Twenty-two months later she gave birth to a dainty female calf, the first in the National Zoo's history. The elephant staff named her Kumari, which means "Princess" in Sinhalese.

Kumari became the main attraction at the Zoo and formed a very special bond with Galloway. She was also a favorite of Nancy, the Zoo's savanna African elephant (*Loxodonta africana*), who often tried to sneak Kumari away from Shanthi-without success. A year passed, and things seemed to be going well. Then one Saturday in 1995, Kumari seemed to have lost her appetite. In the days that followed, her health declined, and one afternoon while Galloway was trying to give her a bottle of milk, she noticed the little elephant's tongue was a purplish blue instead of pink. Kumari died a few hours later, after intensive staff efforts to save her. It was a devastating blow to the Zoo, and one that still brings tears to Galloway's brown eyes.

"Kumari was just a joy, just a pure joy," she says wistfully. "Baby elephants are so full of their own personalities, full of fun, causing trouble, catching on to things so quickly. And

then you watch it one day just end. To see a little life like that stripped before it even has a chance is really hard."

Harder still was not knowing why she died. Richard Montali, the Zoo's head pathologist, was familiar with reports of baby elephants dying around the country and enlisted the help of a young pathology resident, Laura Richman, to try to solve the mystery. When they examined Kumari's internal organs, Richman and Montali noticed evidence of internal bleeding in the heart and liver, with peculiar damage to the cells of blood vessels. Closer inspection of these cells revealed the presence of purple areas called "inclusion bodies," the telltale mark of a viral infection. But what virus?

With support from Friends of the National Zoo's new "Kumari Fund," Montali and Richman examined medical reports from zoos around the country to see if there were any clues to the identity of the virus. After a year of dedicated sleuthing, Richman discovered the killer: a form of herpesvirus previously unknown to science. Now a virologist at Johns Hopkins Medical Center, Richman says the Elephant Endothelial Herpesvirus (EEHV) kills by infecting the cell walls of critical blood vessels in the heart, liver, and tongue (hence the purple color), punching holes in the cells so they can no longer hold blood. Death results from massive internal hemorrhaging and heart failure. Looking back over necropsies (the animal equivalent of autopsies) of other baby elephants as far back as 1983, it became clear that at least eight had been misdiagnosed cases of EEHV. Richman says that in death, Kumari may well have saved the lives of countless other baby Asian elephants.

"Before Kumari...we didn't even know the virus existed," she explains. "We didn't have any idea what the clinical signs of this virus were...Today we have identified 26 cases of the virus in Asian elephants around the world, and we know how to treat it."

The EEHV virus is now considered the number-one killer of elephants under age one. Of the 26 in the U.S. who have so far tested positive for the disease, 22 have died, even after being treated with the anti-viral drug famciclovir. According to Montali, the problem lies in the swiftness of the virus—which often kills within days of its first symptoms—and a general lack of knowledge about when and how much of the drug an elephant should get. Now when a baby elephant gets sick zoos can send a blood sample to Richman's lab in Baltimore and get a diagnosis within eight to 12 hours. But, so far, there is no way to test for the latent virus in healthy animals and, as yet, no vaccine.

There are, however, clues to the source of EEHV. Richman says this particular strain of herpes is probably millions of years old and actually quite rare. And she has a strong, if unproven, suspicion about who Kumari got the virus from: Nancy, the African elephant.

According to Richman, her research shows that there are not one but two EEHV viruses, both originating in Africa. And while the EEHV-1 virus is lethal to Asian elephants, it causes only benign skin nodules in Africans, apparently resulting from a tolerance built up over centuries of exposure to the disease. The second herpes virus, EEHV-2, is apparently as deadly to African elephants as EEHV-1 is to Asians. Montali says that when zoos keep African and Asian elephants

together the virus may get transmitted.

Since the discovery of the virus, zoo officials and the AZA have been discussing a change in zoo policy to keep species separate, Africans with Africans and Asians with Asians. Perhaps even more ominous, Montali says that three cases of the EEHV-1 virus have been reported in Asian elephants in India, one at a zoo and two at a logging camp where working elephants occasionally have contact with wild populations. So far, no one has studied the disease among wild elephants there. Here at the National Zoo, Kandula has shown no symptoms of herpes, and neither have Asian elephants Shanthi, Ambika, or Toni, although Montali says there is always the danger of latent EEHV virus hiding inside one of them, somewhere.

The Mating Game

When Shanthi met Indy one brisk day in March 1991, it wasn't love at first sight. Both needed a lot of coaxing-nearly 20 months' worth-on a honeymoon that cost the National Zoo an elephantine \$20,000. But the number of Asian elephants in the U.S. was small, estimated at only a few hundred animals, and the population in the AZA's SSP program was even smaller. To make matters worse, since the 1990s zoos in North America and in Europe have been facing a serious shortage of breeding-age elephants. According to AZA's figures there are only nine Asian elephants among the SSP's 81 member zoos today who are between 14 and 25, the best age range for elephants to reproduce. Most of the other Asians are too old. The gene pool and fecundity rates for African elephants in the SSP are equally dire.

"The captive population of elephants is not reproducing at a rate fast enough to sustain itself," states Lucy Spelman, Director of the National Zoo. "And one of the reasons for that in the U.S. is we have a decentralized situation in which we have a handful of elephants spread out among many different zoos."

How to get more Asian elephants? Going back to importing elephants from Asia is a solution that's not only anathema to many conservationists but also expensive and difficult. According to Asian Elephant SSP Coordinator Mike Keele, to take an elephant out of India, for example, a zoo would have to prove to the U.S. Fish & Wildlife Service that to do so would not violate any CITES regulations and would be a significant boon to both the individual elephant's welfare and to the wild pachyderm population.

While U.S. zoos have imported a few elephants in recent years, mostly from Malaysia, the number is too small to make a significant impact on the number of elephants in North America. In fact, most zoos have found it difficult and expensive even to shuttle females here in the U.S. from one facility to another for breeding. Transporting males for breeding is considered too dangerous due to their great strength and aggressive nature. All of which put the National Zoo and its lone breeding-age cow Shanthi in a spot. Should the staff try another expensive gamble to transport Shanthi hundreds of miles to another male and hope she became pregnant again?

Enter Thomas Hildebrandt, an expert in animal reproduction from Berlin's Institute for Zoo and Wildlife Research. In the late 1990s, Hildebrandt and his colleagues had been developing a new way to artificially inseminate elephants. This procedure is actually more difficult than it might seem because the reproductive tract of a female elephant is a labyrinth of twists, turns, and blind alleys. But advances in fiber optics, three-dimensional ultrasound, and elephant science brought artificial insemination (AI) within Hildebrandt's reach, and when a collaboration with Janine Brown at the National Zoo was arranged, Shanthi turned out to be an ideal, four-ton guinea pig.

"She actually seems to rather like the process, especially the ultrasound," says Marie Galloway. "She is fully awake and unrestrained except by her trainer. She gets a lot of attention and elephant biscuits. All we ask of her is to stand still. And Shanthi is real good at standing still."

Hildebrandt perfected his unique method on Shanthi and used it successfully on two other elephants in the U.S. before it was Shanthi's turn to try for another baby in February 2000. With six or eight vets around her, and \$100,000 worth of sophisticated equipment inside her, Shanthi was successfully impregnated with sperm flown in fresh from a good-looking bull named Calvin, who then lived in Calgary, Canada. A year and a half later Kandula was born. It was a moment of triumph on many different levels: Kandula was only the fifth birth following artificial insemination in the world, and the National Zoo's second baby elephant. His health and vigor also seemed to dispel the lingering ghost of Kumari and fears of another death. Kandula also changed the very nature of elephant keeping at the Zoo-because he is a male.

Bull elephants are trouble. They are often larger than females, weighing up to 13 tons. Unlike females, Asian males have sharp tusks and during the breeding season enter musth (Hindi for intoxicated), when huge amounts of testosterone surge through their bodies, making them ferocious, utterly fearless, and totally focused on one thing: females. Not surprisingly, bull elephants have not been the sex of choice to exhibit in most zoos and circuses.

Traditionally, zoos train milder-tempered females through "free contact," in which keepers can work with elephants without any barriers. Facilities that can safely hold a bull elephant are not only massive and expensive but also must employ "protected contact," a form of elephant management that always keeps a sturdy barrier between elephant and handler. Bulls can be especially difficult to handle during musth, when most of their training is forgotten in the frenzy, making elephant managing one of the highest-risk jobs in America. But in spite of all this, zoos have had to face the obvious fact that to get babies, some AZA facilities must keep bulls.

In the forests of Asia, wild elephant herds are matriarchal, with a dominant female surrounded by her daughters and grandchildren. Males form loose affiliations with one another and often live on the periphery of the herd, mingling with the females when males come into musth. But until recently this was not the way Asian elephants lived in zoos or circuses. Since they were first brought to North America in the 1700s, elephants have lived largely isolated lives, often in tiny

quarters, singly or in pairs. As more has been learned about these great mammals in the wild—and as it has become clear that members of multigenerational pachyderm families communicate by touch, sound, and smell—the more people have realized that elephants should live communally in zoos. But few zoos have had the resources to house and breed a herd of ten to 15 elephants.

Ironically, the most successful facility to keep an entire elephant herd came from a traditional rival of the conservation movement: the Ringling Bros. and Barnum & Bailey Circus. Since the early 1990s, Ringling Bros.' Center for Elephant Conservation (CEC) in central Florida has taken on the mantle of "Elephant Breeding Capitol of the World," while remaining resolutely unaffiliated with the AZA. But no one can deny its breeding successes. Today Ringling has a herd of 70 elephants spread among its two performing circuses, its breeding facility, and its "retirement center." The CEC alone has 26 elephants, with four pregnant cows and 11 successful births. But they have also had setbacks. Six of their 11 calves have died young, one from herpes.

"We probably have the most successful breeding program outside of Southeast Asia," says John Kirtland, head of the CEC. "My feeling is if zoos are truly committed to elephant conservation they need to expand their herd size, and they need to be willing to keep multiple males."

Politics aside, most members of the zoo community do not dispute Ringling's methods and are slowly changing facilities to reflect this new way of keeping elephants. Eventually, high-tech measures like artificial insemination may not be needed to produce healthy babies. By the time Kandula reaches adolescence, the Zoo habitat he and the other elephants inhabit will have changed radically.

As part of its ten-year plan for an Asia Trail, the National Zoo is developing a new elephant facility that will be able to accommodate bulls and house as many as six cows as well. Still in the design phase, the habitat will be reminiscent of a South Asian forest, with wide, winding trails nearly a mile long that will not only allow visitors to view the elephants in different places, but will also provide vital exercise to keep the pachyderms' physiques in top form.

The facility will also creatively incorporate both free and protected contact forms of elephant management. A new 25,000-square-foot elephant barn will include a bathing pool and separate areas for males and females, with the option of romantic rendezvous when the time is right. By 2007, the new elephant area will be ready to replace Kandula's current home, which was built in the 1930s. Spelman envisions the project as a crucial step in the global commitment to save Asian elephants—one that begins with the visitor.



"This is an incredible opportunity to say, 'Here is the story about being an elephant and why we are building them a bigger place to live. And here is why it's important to preserve them as a species.'"

MORE! How Many Elephants? The Divinity Nobody Wants (Elephant Divinity),

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