

HERBIVORES IN JAPANESE ZOOS, 2013

BY KEN KAWATA

The final installment of the Japanese zoo animal series profiles a loosely combined group of three mammalian orders Proboscidea (elephants), Perissodactyla (odd-toed ungulates) and Artiodactyla (even-toed ungulates). These groups share similar habits toward herbivory, an adaptation for feeding upon coarse plant materials. They maintain a diversity of feeding styles, as some consume fruits and seeds while most tend to be grazers and browsers; some are hindgut fermenters and others are ruminants. Some families possess horns and antlers. These natural history traits require similar husbandry accommodations in zoos. Also, these orders include members that are on top of the universal animal popularity scale; they include pachyderms, an arbitrarily combined group of elephants, hippos, rhinos and tapirs, in addition to giraffes and zebras.

The 2013 Japanese Association of Zoos and Aquariums (JAZA) Annual Report lists 87 zoos and 64 aquariums as of 31 March 2014, the end of Japan's fiscal year (JAZA 2014). Nearly all exhibitors of these mammals are zoos. Table 1 depicts the species and numbers of the three orders maintained by JAZA members as of 31 December 2013 (JAZA, 2014). As for decade-by-decade comparisons, refer to Kawata (1994; 2008). Possible errors in data compilation are mine. Domesticated forms have been excluded with the exceptions of camelids and reindeer, since these mammals are traditionally regarded and exhibited as "exotics" by zoos in industrialized countries. Should all forms of the domesticated, such as horses, sheep and goats, be included, the actual numbers are much larger than shown in Table 1. To simplify statistics taxa have been lumped into full species, although the original inventory lists many subspecies, a subject which will be discussed below. Taxonomy has largely been taken from the JAZA inventory.

Collection Highlights

Postage stamp collection? A review of the numbers of animals in proportion to their holders leaves an impression of a tendency toward a "postage stamp collection" practice by Japanese zoos. This is typically noted in the hippopotamus. Out of 24 holders 13 were either single-animal or single-sex holders. Same can be said about elephants; of the 53 holders of both Asian and African species, 16 were single animal holders. (Interestingly the situation seemed more encouraging for rhinoceroses, since only six out of 27 of all rhino holders were single animal keepers.) Likewise 14 out of 52 holders of giraffes had single animals, and of the rest, 14 had monogamous pairs.

Table 1. Herbivores in Japanese zoos, 2013

Species	No. of animals	No. of zoos
Elephantidae		
Asian elephant (<i>Elephas maximus</i>)	19.57	36
African bush elephant (<i>Loxodonta africana</i>)	7.30	15
African forest elephant (<i>L. cyclotis</i>)	1.1	2
Equidae		
African wild ass (<i>Equus asinus</i>)	1.1	1
Burchell's zebra (<i>E. burchelli</i>)	54.103	32
Grevy's zebra (<i>E. grevyi</i>)	9.12	9
Mongolian wild ass (<i>E. hemionus</i>)	1.0	1
Przewalski's horse (<i>E. przewalskii</i>)	3.7	2
Mountain zebra (<i>E. zebra</i>)	4.5	6
Tapiridae		
Baird's tapir (<i>Tapirus bairdii</i>)	2.1	2
Malayan tapir (<i>T. indicus</i>)	19.15	11
South American tapir (<i>T. terrestris</i>)	14.15	12
Rhinocerotidae		
White rhinoceros (<i>Ceratotherium simum</i>)	16.28	14
Black rhinoceros (<i>Diceros bicornis</i>)	10.12	10
Indian rhinoceros (<i>Rhinoceros unicornis</i>)	5.3	3
Suidae		
Wart hog (<i>Phacocoerus africanus</i>)	3.1	1
Red river hog (<i>Potamocoerus porcus</i>)	8.5	2
Wild hog (<i>Sus scrofa</i>)	10.21	16
Tayassuidae		
Collared peccary (<i>Pecari tajacu</i>)	26.10	3
Hippopotamidae		
Pygmy hippopotamus (<i>Hexaprotodon liberiensis</i>)	2.7	4
Hippopotamus (<i>Hippopotamus amphibius</i>)	20.26	24
Camelidae		
Domestic Bactrian camel (<i>Camelus bactrianus</i>)	16.25	17
Arabian (dromedary) camel (<i>C. dromedarius</i>)	9.18	9

Llama (<i>Lama glama</i>)	71.107	37
Alpaca (<i>L. pacos</i>)	12.24	12
Tragulidae		
Lesser Malayan chevrotain (<i>Tragulus javanicus</i>)	1.2	1
Giraffidae		
Giraffe (<i>Giraffa camelopardalis</i>)	59.78	52
Okapi (<i>Okapia johnstoni</i>)	3.4	3
Cervidae		
Axis deer (<i>Axis axis</i>)	60.71	6
American wapiti (<i>Cervus canadensis</i>)	15.48	3
Sika deer (<i>C. nippon</i>)	239.363.1	49
Fallow deer (<i>Dama dama</i>)	64.83	8
Pere David's deer (<i>Elaphurus davidianus</i>)	4.7	3
Reeve's muntiac (<i>Muntiacus reevesi</i>)	32.23	8
Reindeer (<i>Rangifer tarandus</i>)	10.29	8
Antilocapridae		
Pronghorn (<i>Antilocapra americana</i>)	1.0	1
Bovidae		
Blackbuck (<i>Antilope cervicapra</i>)	75.134.30	9
Gunther's dikdik (<i>Madoqua guentheri</i>)	2.1	1
Japanese serow (<i>Capricornis crispus</i>)	29.28	19
American bison (<i>Bison bison</i>)	49.60.1	17
Gayal (<i>Bos frontalis</i>)	1.0	1
Lowland anoa (<i>Bubalus depressicornis</i>)	1.0	1
Cape buffalo (<i>Syncerus caffer</i>)	17.9	2
Eland (<i>Taurotragus oryx</i>)	28.39.1	10
Sitatunga (<i>Tragelaphus speki</i>)	23.32.4	7
Barbary sheep (<i>Ammotragus lervia</i>)	35.27.26	14
Golden takin (<i>Budorcas bedfordi</i>)	5.6	3
Markhor (<i>Capra falconeri</i>)	22.28.7	4
Himalayan tahr (<i>Hemitragus jemlahicus</i>)	35.48.4	4
Himalayan goral (<i>Naemorhedus goral</i>)	1.0	1
Mountain goat (<i>Oreamnos americanus</i>)	1.2	2
Bighorn sheep (<i>Ovis canadensis</i>)	8.9	4

Mouflon (<i>O. musimon</i>)	79.91	6
Bharal (<i>Pseudois nayaur</i>)	14.12.4	3
Chamois (<i>Rupicapra rupicapra</i>)	1.0	1
Addax (<i>Addax nasomaculatus</i>)	6.7.3	1
Roan antelope (<i>Hippotragus equinus</i>)	5.14	4
Sable antelope (<i>H. niger</i>)	2.0	1
Scimitar-horned oryx (<i>Oryx dammah</i>)	21.36.10	10

The postage stamp collection approach of maintaining one or two individuals per species is also noted in species kept by small numbers, such as wild asses, pronghorn and chamois.

Inconsistent and uneven. The subspecies (or geographic races within a species) have been an issue for frequent discussions in zoos across the world. In terms of mammals and birds, the attention paid to the subspecies by zoos has appeared rather uneven and inconsistent. It largely depends on the particular species, but the lack of attention to subspecies should not automatically be regarded in good or bad, right or wrong context. That point aside, we note interesting examples of subspecies mentioned in the JAZA report. Zoos do not seem to be interested in subspecies of elephants except in case of the Sri Lankan race of the Asian species, *maximus*. Ten out of 76 Asian elephants were said to be from Sri Lanka. As for Perissodactyla, subspecies in the Burchell's zebra were most frequently described. Of the 157 animals 87, or more than half, were listed as *bohmi* or Grant's, while 48 were *antiquorum* or Damara; only 21 were listed with no subspecies designation. In the mountain zebra, six out of nine were *hartmannae*. In another large herbivore, the giraffe, 103 out of 137, or 75%, were *reticulata* or reticulated, 14 were *tippelskirchi* or Masai while the rest was simply listed as generic "giraffes."

The issue of subspecies becomes quite important in terms of endangered status and captive breeding programs, the black rhino being a good example. The national number was so small, 22 animals held by 10 zoos but only three had no geographic origin. Eighteen were listed as *michaeli* or East African, and one as *minor* or South-Central African.

Examining Native Species

Japan has no extant native species of Proboscidea and Perissodactyla while it is home to three native species of Artiodactyla: wild boar, sika deer (with the exception of a small number from the Taiwanese origin, to be discussed below) and Japanese serow. The first two have wider distributions in the Palearctic and Oriental regions, while the third is found only in Japan. Subspecies are frequently reported on the holdings of the first two, as zoo staff are more familiar with the animals' geographical origins (there was no mention on the subspecies of the Japanese serow).

Sacred deer. The wild boar does not hold a prominent status in zoos despite its popularity as a game animal. Twenty-six of them in Table 1 belonged to *leucomystax*, the Japanese mainland race, while two were listed as *riukiuanus*, or the Okinawan; the rest was given no subspecies and that added up to a mere 31 boars. By contrast Sika deer, another native animal, takes a prime spot in folk culture and are associated with Shinto shrines as the sacred deer. They adapt to captive life comfortably, being ubiquitous in Japanese zoos. It occupies the largest number (603) of all species in Table 1. Of these fifty-seven had descended from Taiwanese ancestry, *taiouanus*. For all others, for whatever the reason 56% were reported with no subspecies which is odd (it would be logical to assume that they were from the mainland race from Honshu island, *centralis*, despite the absence of information in the inventory).

That aside, subspecies within the Japanese archipelago were well represented by zoos. Here follows a reminder of the Bergmann's Rule: Within a broadly distributed taxonomic group the populations of larger sizes are found in colder environments, and populations of smaller sizes are noted in warmer regions. Based on this, the largest subspecies is *yessoensis* from the northernmost mainland Hokkaido (30 of them kept in five zoos). Imaizumi (1960) gave examples of body measurements of sika deer, and from his book shoulder heights are used below as an indicator. He described shoulder heights of *yessoensis* as 101 cm for male and 84 cm for female. By comparison, for a southern subspecies *nippon* from Kyushu and Shikoku islands (20 deer kept in three zoos) the shoulder height was given as 80 cm. Even smaller is the population of *yakushimae* from Yaku island, further south of Kyushu; 236 were kept in 27 zoos. There is an intermediate form *mageshimae* between *nippon* and *yakushimae*, and 31 were kept by one zoo. Also, another zoo kept one deer from Tsushima, an island between Japan and Korea, the subspecies *pulchellus*.

Sika deer is common in zoos both in Japan and the United States, yet if one tries to dig information beneath its familiar appearance, he may come across unexpected topics. An example: Size and geography, as mentioned above. In 1969 the late Marvin Jones, a self-made zoo historian, visited a zoo in Yokohama. Watching a sika deer, he was surprised by its size. When asked about its geographical origin, the staff said it was captured in a nearby mountainous region, indicating its subspecies to be *centralis* (whose shoulder height by Imaizumi is 83-86 cm). Marvin then noticed that the sika deer in American zoos were smaller than the mainland (Honshu Island) stock. In fact, those in American zoos seem to fit the description of the Yaku Island deer *yakushimae*: the body is smaller and the ground color darker, compared to those from Honshu, *centralis*. The key question, then, is the geographic origin of the founder stock of America's zoo population. Years ago, I overheard a rumor that the original stock of sika in America came from a southern island (Yaku is one of the islands). Different approaches appear necessary to clear up the question: Locating historic records and use of techniques of modern biology. Some researchers may already have the answer. Nevertheless, there is no shortage of research materials in zoo animal collections.



Yaku Island sika deer in winter coat, Inokashira Park Zoo. Typically, most yakushimae stags are six pointers; stags of other subspecies are usually eight pointers. Photo: Akiyoshi Nawa



Sika deer from Hokkaido, *yesoensis*, in summer coat, Ueno Zoo. The largest race in Japan, the shoulder height of a stag reaches ca. 1m. Photo: Akiyoshi Nawa

Unafraid of man. Compared to the first two species, the endemic Japanese serow *Capricornis (Naemorhedus) crispus* distinguishes itself because of its unique appearance of the goat antelope. In its habitat, it is known for strange behavior; for a wild ungulate it exhibits a peculiar lack of fear of man. In my limited experience, when approached on foot and talked to (to draw attention), it just stood there, appearing curious, unlike a herd of sika in the same mountain that flew away at the sight of me. (That makes the species an easy target. Back in the 1960s, an elderly former hunter confided: “I once wiped them out from a whole mountain.” Presumably it was before the issuance of a stricter game law.) Those who had initial contact with wild-caught specimens also noted the lack of fear of man. Some individuals are tractable and can be led with collar and leash. Up until the mid-1960s it was believed to be a difficult mammal to keep in captivity, but that turned out to be just a myth (Kawata, 2001). Table 1 reveals 19 holders of this animal by JAZA members. They are now in European zoos as well, including Berlin Zoo, Magdeburg Zoo, Tiergarten Schonbrunn, Usti Zoo and Highland Park Wildlife Park (Zootierliste, 2014)

Charismatic Giants

Some people associate lions with zoos, commenting that they are the face of zoos; they say elephants typically epitomize circuses. But others believe that elephants reside in the center of the zoo animal collection. There is no question that elephants are among the most important in the zoo animal collection. The high visibility of elephants makes them the source of news stories, debates and a public relations double-edged sword. Frequently, animal extremists choose elephants as their convenient and favorite propaganda tool for the alleged animal abuse and cruelty. Those activists target zoos and circuses alike; both are no isolated islands, and cannot insulate themselves from external forces.

Ambassadors of peace. Zoos are also vulnerable to man-made catastrophes, the worst of them being wars; modern history is peppered with zoos being destroyed by wars. In the United States, zoos have fortunately been unaffected by the devastation of wars, including World War II. But it takes a different dimension on the losing side, such as Germany and Japan. Because of the immense size and popularity, the saga of elephants as victims of war stirs up emotions. Take, for example, a photo of a pile of dead elephants in Berlin, a vivid reminder of the saturation bombing during World War II. Allied bombing killed one-third of Berlin Zoo’s animals during two nights in January 1944, including seven elephants, one rhino, two giraffes and 17 antelopes (Strehlow, 2001). Similarly, many once-magnificent European zoos were reduced to rubble.

Unlike the European counterparts Japanese zoos did not suffer extensively by bombing, nor from street-to-street fighting. What did the job, instead, was a firm order by one high official of the national government to destroy “dangerous” zoo animals, and killings, by any means possible, began even before the heavy allied

bombing. Itoh ably chronicled the killings in detail (2010). At Ueno Zoo in Tokyo, the nation's capital, attempts to kill three Asian elephants by poisoning failed, leaving the last resort: Death by starving. It took John, a male, 17 days to die; the females expired after 18 and 20 days, in 1943. [This account by no means provides a platform to question whether or not such was an *avoidable* heartbreaking tragedy.] These elephants were later immortalized by the public as victims of war.

When the Pacific theater of World War II began in 1941 there were about 20 elephants in Japan. When the war ended in August 1945 there were three elephants left, all Asians: one in Kyoto (died in January 1946) and two in Nagoya. It was a small miracle that they survived the war-time conditions. Long-awaited freedom arrived by way of transplanted American-style democracy, but the country, left in ashes and ruins, was under foreign occupation and the recovery process was slow. The demoralized and impoverished populace was in dire need for something to brighten their day. During this period, moved by pleas from children of Tokyo, Prime Minister Jawaharlal Nehru of India sent a female elephant to Ueno Zoo in 1949. Named after his daughter, Indira, portrayed as the ambassador of peace, was welcomed feverishly. Soon a traveling menagerie was organized with her as the main feature, to introduce her to other cities. Its immense success resulted in an unintended and unexpected outcome: Boom years of zoo construction that produced an unprecedented number of zoos (Kawata, 2005). In 1959 and 1960 I was a summer student intern at Ueno, and felt privileged, seriously, to be allowed to shovel Indira's droppings.



A young female from Thailand, the first post-World War II elephant to Osaka Tennoji Zoo, was greeted at the port by an enthusiastic crowd in April 1950. Photo: Osaka Tennoji Zoo

In Osaka, the economic and financial center of western Japan, those pachyderms were sorely missed by citizens. After a seven-year absence of elephants, a two-year old female named Haruko arrived at Tennoji Zoo from Thailand on 14 April 1950. Enthused citizens caused traffic jam on the route between the port and the zoo, stopping the street car operation while an eager crowd of 10,000 waited for her debut at Tennoji. Just as in Tokyo, massive crowds inundated the zoo beyond their capacity to accommodate them. Two days after Haruko's arrival happened to be a Sunday, and an estimated crowd of 60,000 paid visitors flooded the zoo (only 6 ha. in size at the time), the record that has not been broken since (Tennoji Zoo, 1985). If citizens' excitement appeared over-heated, here is a quote from my previous writing:

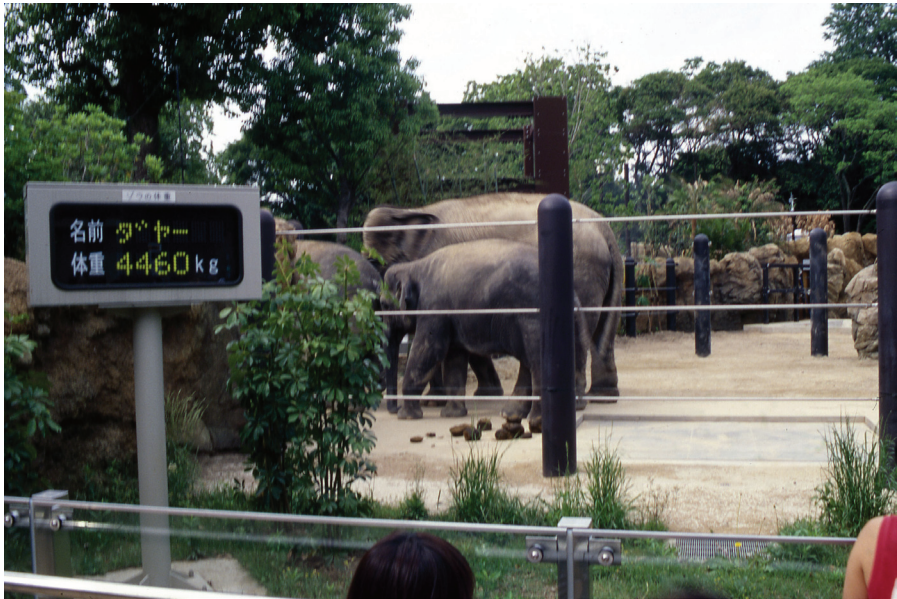
The current generation of Japanese cannot begin to fathom what "peace" meant in the years following the end of war: precious and noble. In this context, the arrival of an elephant carried significance far greater than any other exotic beast coming to town. The local zoo welcoming an elephant reminded citizens that the nightmarish years of military dictatorship and war were now behind them, that they could take families to the zoo again. For them, a zoo symbolized peace; they knew that only during peacetime could a zoo thrive. (Kawata, 2005)

Thus, an arrival of an elephant shed a ray of hope after years of crippling national crisis. In essence, the elephant served as a form of emotional glue for some Japanese communities. The shared experiences---the excitement of squeezing into a jam-packed street car to the zoo, a glance at a gray giant (or a part of her) over the heads of a huge crowd from dad's shoulders---would help to define a generation at a specific post-war period. It was a moment firmly etched in memory, to witness elephants morph from casualty of war into guarantor of hard-won peace. For sure an elephant is a popular animal, but the adjective does not do it justice. Because history transformed elephants from exotic beasts of far-away lands to an icon, a social phenomenon beyond the confinement of a zoo.

Haruko lived through the era of sweeping societal changes and economic prosperity, and died on 30 July 2014 due to advanced age, estimated to be 66 years old. At that time she was the second oldest elephant in Japan (more on longevity momentarily). Japan now enjoys unprecedented consumerism and the signs of material wealth are abundant. It is hard to believe that merely seven decades ago, life's essential needs from food, clothes to housing were in extremely short supply for humans. Yet the mists of time have not obscured the war-time story of zoo elephants, still appearing in the bookstore shelves every now and then. For zoos in Japan, the image of an elephant takes up a different societal significance compared to the American counterparts.

An African question. Continuing on elephants and switching the continents, Africa's forest elephant, *cyclotis*, presents an interesting taxonomic issue. Like a tennis match, it has gone back and forth between a subspecies of *Loxodonta africana* to a full species status. African elephants are latecomers in Japan and the taxonomic challenge is a new one. Based on data provided by Mr. Katsunori

Sotani of Tokyo, the first officially recorded forest elephant was a female, arrived at Asahiyama Zoo in Hokkaido on 17 October 1980, and died on 21 April 2006. She was followed by another female at Tokuyama Zoo, arriving there on 27 July 1981. Both were estimated to have been born in 1977. Then a male arrived at Okinawa Kodomonokuni (meaning children’s country) Zoo and Aquarium on 26 March 1983, and died on 25 April 2001 (Sotani, pers. comm., 2010). (To avoid confusion, please note that Okinawa has another zoo in Nago.) Meanwhile in Hiroshima, Asa Zoo imported a female from west Africa, believed to be a bush elephant, on 13 May 2001. Five years later a test revealed that she was a *cyclotis*, bringing up the number to four on record in Japan. The challenge for zoo historians, however, may not be over. (Future research may reveal, although chances are remote, that there were more forest elephants that landed on Japanese soil.)



Asian elephant exhibit at Ueno Zoo, Tokyo. Photo: Akiyoshi Nawa

First and Only

Decades ago when zoo people got together, three words used to surface sooner or later: *First*, *Only* and the *Most*. Those terms became antiquated as the new era has changed the fabric of zoo thinking. Yet, concerning rarity, even today we hear smattering of the *first* and the *only*. In terms of megamammals such as rhinos, four out of five extant species have been imported to Japan (the last species to be imported is the Javan, but there is no realistic chance that we will ever see one in a zoo in our lifetime). The first was a Sumatran, the *first* and *only* for its species that landed on Japanese soil. It arrived at Tennoji Zoo on 21 June 1921 and died of uremia on 30

January 1925 (Tennoji Zoo, 1985). The next rhino on record was a black, among the cast of animals brought in by the Hagenbeck circus in 1933. But this animal was expensive and with no buyer stepping forward, the rhino left the country. The first black rhino for permanent exhibit was a male, provided by Carr Hartley of Kenya and arrived at Ueno Zoo on 28 July 1952 (Takashima, 1986). The third rhino species on the list was Indian; a male was received by Tama Zoo, Tokyo on 10 November 1958 (Tokyo Zoological Park Society, 2008). Tokyo was also the recipient of the first white rhinos: A male and a female entered Ueno Zoo on 5 August, 1966 from South Africa (Ueno Zoo, 1982).



Gumma Safari Park had the first African elephant birth in Japan. The male calf was born on 5 May 1986. Photo: Gumma Safari Park

Thanks to the cross-oceanic transportation route to southern Asia, Japan received elephants from early years, the first one reaching its port in 1408 as a gift to the shogun, the supreme military ruler (Takashima, 1986). The first specimens for zoos expectedly went to the first zoo in Japan, opened in Ueno Park, Tokyo in 1882. A gift to the royal family, a male and a female arrived on 25 May 1888 from Siam (Ueno Zoo, 1982). Elephants, regardless of the species, were a rarity then. Animals from Africa entered the picture much later, by comparison to the Asian cousins. The title of the first African elephant to Japan goes to a young male who arrived at the port of Moji in March 1953, and was purchased by a large-scale traveling menagerie, World Animal Expo, a.k.a. Nippon Zoo (Kawata, 2005).

The last of the large herbivore for the topic of the *first* is the hippopotamus, and Ueno Zoo has the honor of exhibiting the firsts of both species. A young male hippopotamus was purchased from Hagenbeck, arriving on 23 February 1911. It was after the World War II that the pygmy hippopotamus, once extremely rare in zoos across the world, made an entry as a female arrived on 14 July 1960. I was a student intern at Ueno and remember that warm sunny day. The wooden crate door opened, and the animal stepped out calmly in “what’s-all-this-about” manner, a sensational moment for a student. It was no doubt a history-making event for zoo enthusiasts. Stepping back for a moment, however, sooner or later we will know: When digging into history we are often wading into a murky stream of confusing events, and not at all sure-footed. Extreme caution is necessary when dealing with historical data.

Beginning around 1957, Japan saw unprecedented wave after wave of exotic animals landing on its shore. In the pre-CITES era, fleets of ships and later jumbo jets delivered rare animals in a rampant race to satisfy the voracious appetites of large-scale traveling menageries and newly-built zoos. For a zoo historian, it was quite a task to keep track of exactly when, how many of what species were imported through various ports of entry. One might assume the quickest way would be to examine the customs house records, but that does not include illegal importations. Also, we may have to first define what *first* exactly means: the landing by a member of a species, new to a nation? Or the exhibition of such an animal to the public? Because there must have been a case of an animal that died after arriving at an animal dealer’s compound before reaching a zoo, thereby leaving no trace in the nation’s zoo history.

Getting on a tangent, it was common for animal dealers to exhibit their precious merchandise from lemur, proboscis monkey, Komodo dragon to elephant, in rudimentary accommodations on the rooftop of department stores. That is how I saw my first coscoroba swans on the rooftop of a Tokyo department store in the 1960s. If such an animal failed to find home at a zoo, more likely it escaped an eye of a zoo historian. Here is another sticky point: Some animals arrived with inaccurate species identification. As an example, back in the 1960s I spotted a Galapagos penguin, listed as a juvenile Humboldt, in a municipal zoo and to my knowledge, it was the first to Japan.

At any rate, it is not too far-fetched to assume that a bonobo or two entered Japan labeled as a chimpanzee, and that applies to *cyclotis* too, arriving as generic “African elephants” without proper identification. Circling back to the first pygmy hippo, according to zoo enthusiast “Yoshi” Yonetani of Kobe, an individual (a rich man?) in western Japan kept a pygmy hippopotamus from Liberia in his backyard, and it took place even before Ueno received its first one (pers. comm., 2014). It would be so easy for us to shrug it off, since there is no way to prove it now. Dumbfounding as the story sounds, it points up the difficulty of searching for accurate data by wading into the murky stream. And the stream becomes deeper with time. It almost appears that attempts to hunt for historic information on an animal resemble UFO (Unidentified

Flying Object) sightings on a mountaintop in a remote American desert. A sensitive radar is what we need, yet it remains a pie in the sky.



The first and only Sumatran rhino to Japan arrived in 1921 and died in 1925 at Tennoji Zoo.
At the zoo's storage room. Photo: Ken Kawata

A Long Road to Successful Breeding

Achieving successful breeding has been a slow process for some large herbivore species. In more recent decades, we have noticed encouraging examples. Focusing on selected members of the heavy-weight (literally) mammal group, Table 2 shows history of first-time breeding in Japanese zoos, limited to those with survived calves. As expected, zoos witnessed hit-and-miss cases before reaching the first success. Taking Asian elephants as an example, the first event took place at Takarazuka Zoo on 6 May 1965, when a full-term calf was still-born. This was followed by Toyohashi Zoo that reported a miscarriage on 5 May 1995; Kobe Oji Zoo had a stillbirth on 11 January 2002 and again, Toyohashi had a stillbirth on 1 March, 2003 (the dam also died after three months). Outside of the boundary of zoos, there was a noteworthy birth in Osaka. From Thailand, a herd of elephants was brought in for the world expo which was opened in March 1970, participated by 77 countries. On the expo grounds a calf was born on 16 August, thus marking the first viable elephant birth in the country. The dam and the calf left Japan after the world expo.

Table 2. First-time Breeding (with surviving calves only) of Selected Herbivore Species in Japanese zoos.

Species	Institutions	Dates
Asian elephant	Kobe Oji Zoo	2 March 2004
African elephant	Gumma Safari Park	5 May 1986
Black rhino	Kobe Oji Zoo	16 November 1963
Indian rhino	Tama Zoo	20 December 1973
White rhino	Miyazaki Safari Park	12 April 1978
Hippopotamus	Kyoto Zoo	19 June 1935
Pygmy hippopotamus	Ueno Zoo	21 April 1962
Giraffe	Ueno Zoo	11 July 1937
Okapi	Yokohama Zoo	21 November 2000

Main sources: JAZA (2005), Ueno Zoo (1982)

A discussion on the history of hippopotamuses in Japanese zoos must include a special note about Korea. A pair (estimated age: three) arrived at Changkyungwon Zoo in Seoul from Hagenbeck in 1912 (at this time Korea was one of the exterior territories under Japanese control). They produced a total of 12 calves between ca. 1914 and ca. 1937. Of these, five died soon after birth, four were sent to mainland Japan but a family group of four or five was always on exhibit as the zoo's main feature. Ueno Zoo received two from Seoul. They gave birth to Tokyo's first calf on 31 May 1930, but it expired within five minutes. This was followed by another

calf born on 8 July 1936, but it died on 16 July. The third calf was a success, born on 27 May 1938 (Takashima, 1986). Hagenbeck was the chief exotic animal provider then, and among its customers was Kyoto Zoo. A female hippopotamus arrived, escorted by a German, on 21 December 1927 (assumedly from Hagenbeck although the record identifies no vendor). She was joined by a male from Hagenbeck, arriving on 24 August 1930. A female calf was born on 8 December 1933, but lived for only four days. The pair produced another female, this time successfully, on 19 June 1935 followed by another female, on 9 September of the following year. (Takizawa, 1986)

There are several approaches to review high neonate mortality among those mammals. One obvious viewpoint is the inadequate husbandry accommodations during early years despite efforts by the zoo staff. Another is that such is expected for primiparous dams. Yet the third reason, in case of hippopotamuses at Ueno, appears to be the level of inbreeding coefficient that causes poor neonate survival. From today's standard, the fact that Ueno, which represents Japan's zoos, mated siblings from Seoul is indicative of a non-professional husbandry practice. However, in examining such historic data we must put ourselves in the shoes of those who managed zoos a century ago. It was the time when maintaining individual animals was often an insurmountable challenge, the country had only a handful of hippos and when a birth of such an animal was truly a blessed event.

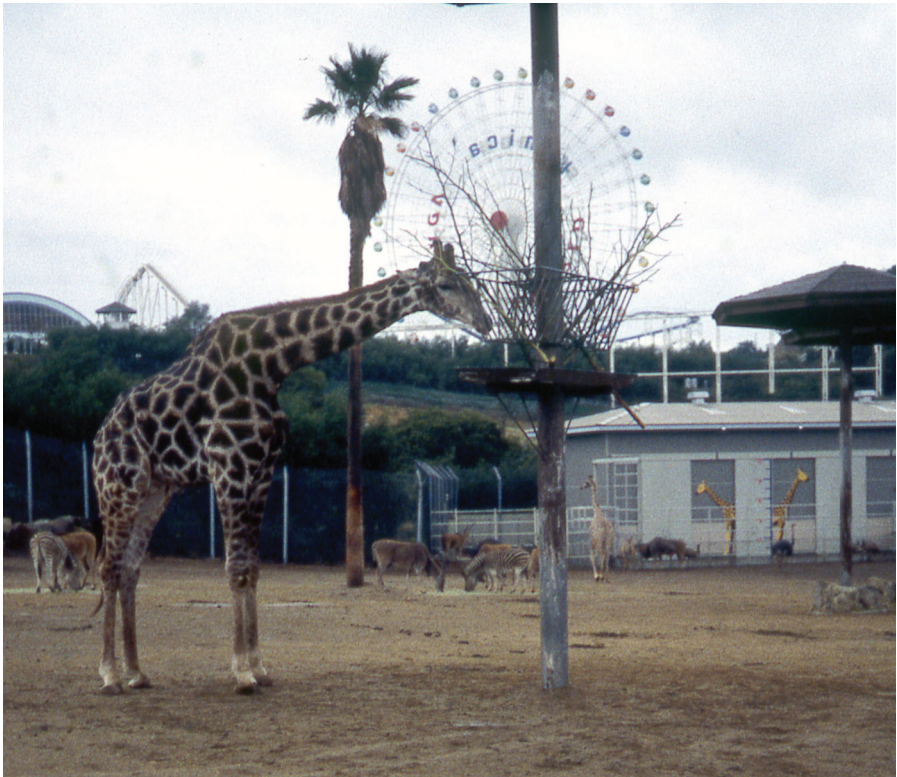
Breeding during 2013

As for the current period, Table 3 depicts births of the three orders during the fiscal year, based on JAZA data (2014). All were born in zoos and no aquarium reported herbivore breeding. No species of wild camelid and pigs reproduced during the year. Although elephants are among the most reliable crowd pleasers, the goal of establishing self-sustainable populations has remained elusive in Japan. In spite of such a backdrop Table 3 indicates that both Asian and African elephants have begun to reproduce, albeit at a slow pace. Ichikawa Elephant Kingdom near Tokyo and Kyushu Natural Zoological Park bred Asians while Tobe Zoo had an African born, and all calves survived. Also encouraging are the birth of rhino calves, an Indian at Kanazawa Zoological Gardens in Yokohama and a southern white at Fuji Safari Park. Despite the concern by some zoo staff members that giraffes have not been reliably reproducing in recent decades, 15 calves were born in 11 zoos and nine of them survived.

Table 3. Herbivores born in Japanese zoos between 1 April 2013 and 31 March 2014. (Figures in brackets represent the number of surviving neonates.)

Elephants 3(3) in two species	Equids 11(5) in two species
Tapirs 1(1) in one species	Rhinoceroses 2(2) in two species
Hippopotamuses 2(0) in two species	Cervids 121 (65) in six species
Giraffes 15(9) in one species	Bovids 226(113) in 17 species
Chevrotains 1(0) in one species	

Bovids and cervids usually have the largest numbers of offspring born, and this year was no exception. A total of 226, or 60 per cent of all herbivores born during the year, belong to bovids, many of them from commonly exhibited species such as blackbuck (77), mouflon (38) and markhor (30). Of the 121 cervids 56 were axis from three zoos; 43 of them were reported by Himeji Central Park. The next come the native sika with 45 born in 10 zoos. Interestingly, “classic” zoos with generalized large animal collections, located near or in the center of big cities, used to champion animal breeding records. Those well-established zoos began as municipal (exceptionally, Ueno Zoo in Tokyo started as a part of the national government), and took leadership positions in all aspects of zoos from animal husbandry, education and conservation activities. Time has changed. Japan began to see diversification in the zoo field as privately-operated, specialized zoos came into the picture, located in small to medium-sized cities. They began to dominate herbivore breeding results. Fuji Safari Park bred more species than others with 11 species in five families, followed by Himeji Central Park with 10 species in three families. Both are privately-owned, profit-oriented operations.



Giraffe exhibit at Adventure World, an amusement park with a large animal collection, south of Osaka. Photo: Ken Kawata

Longevity

Table 4. represents specimens of selected species that had been living for at least 25 years as of 31 March 2014 (JAZA, 2014). As in any other data gathering process, the reliability of records becomes an often uncomfortable issue. Individual identification for large mammals, the subject of this account, seems so straightforward. Yet, frustrations are never too far away while tracking individual animals. One obvious problem is clerical errors, something that is unavoidable across the world. Yet another is sloppy record-keeping; at least five zoos, most of them small, did not list the exact arrival dates of their charges. They simply reported the years in captivity. Those are, luckily, exceptional. Nearly all zoos kept at least the entry dates into their collections. Meticulousness of documenting individual animal's history depends on the zoos' commitment to professionalism. Complete background of the animal, including the place and date of birth and parentage (if known), subspecies, previous holder(s) is the building block of scientific source material. A failure to list previous holder(s) can cause confusion and inaccuracy. Nevertheless, longevity data from the annual reports are a fairly good indicator of the competency of animal husbandry by Japanese zoos.

Table 4. Longevity of selected herbivore species in Japanese zoos. The years indicate duration in captivity, living as of 31 March 2014. (Figures in parentheses indicate sexes, i.e. 1.0 = one male, 0.1 = one female.)

Species	>40 years	35-39	30-34	25-29	Total
Asian elephants	13 (2.11)	1(0.1)	1(0.1)	5(2.3)	20
African bush elephants	1(0.1)	4(0.4)	2(1.1)	0	7
White rhinoceroses	0	7(1.6)	2(0.2)	1(0.1)	10
Black rhinoceroses	1(0.1)	0	0	0	1
Indian rhinoceroses	0	0	0	1(1.0)	1
Hippopotamuses	3(2.1)	3(1.2)	2(1.1)	3(2.1)	11
Total	18	15	7	10	

Somewhat surprisingly, no giraffe or pygmy hippopotamus made it to the list, or lived for at least 25 years as of 31 March 2014, the end of fiscal year for the country. Although not on Table 4, four zebras lived at least a quarter of a century including a captive-born female Grant's that clocked 31 years; the only tapir to reach the quarter century mark was a male South American, born on 14 July 1987. Not surprisingly, elephants and hippopotamuses dominated the list. Well over a decade into the new millennium, elephants that arrived in the post-World War II era (be reminded that while the war ended in 1945, Japan was under occupation by the Allies until 1951) are fading away, a quiet departure in clear contrast to the overwhelming public enthusiasm at their arrival as young calves.

Elephants in the upper age class on the table are mostly females, the result of zoos' tendency to avoid males. There were four Asians that exceeded the 50-year mark. The most "senior" was a female "Hanako" (flower child) who arrived at Ueno Zoo as its first post-war elephant on 3 September 1949, and transferred to Inokashira Park Zoo in a Tokyo suburb on 5 March 1954. (On 26 May 2016, she was found dead at the estimated age of 69.) "Haruko" (spring child) ranked second, arriving at Osaka Tennoji Zoo on 14 April 1950; as noted above, she died on 30 July 2014. Next came "Anura" (not a frog!), a male donated by the prime minister of Ceylon (now Sri Lanka) and arrived at Ueno on 9 November 1956, and was transferred to Tama Zoo on 28 April 1958, just in time for its opening on 5 May. The last on the list of residents for half a century: a female at Obihiro Zoo in Hokkaido. Alas, the zoo simply states "50 years" with no further information.

As a new comer (relatively speaking) on the zoo scene, the African (bush) elephant has not made an impressive entry to the longevity list. The only one in the forty-plus year category was a female that arrived at Tama Zoo on 21 July 1967. As far as can be determined, no elephant on the list was zoo-born.



Japanese serows can be tractable and led by collar and leash. At Yagiyama Zoo, Sendai.

Photo: Ken Kawata

And that leads to the topic of captive-born animals, whose ages can be traced. Of the six hippopotamuses that lived a minimum of 35 years, at least four were born in Japanese zoos, and there is a reason for the cautious use of the term *at least*. Backgrounds of most of these animals have been documented. However, Obihiro Zoo, the holder of one male, reported “45 years of age, 41 years in the zoo” with no further detail. Assumptions are dangerous, but he could be captive-born. Because it was a wide-spread practice in zoos to accept animals delivered by dealers without demanding any individual data. Thus, zoo-born animals used to be moved around the country as if they were travelers without proper immigration documents. Quite possibly, the practice of heavy reliance on dealers as *the* chief source of animals (Kawata, 2015) is slowly dying out. Increasingly, studbooks are in use, and I hope that the level of staff awareness on professionalism (at least in mainstream institutions) is slowly on the rise. After all, why bother to keep animal records were it not for measuring continuity?

Epilogue

An article titled “A Review of Primates in Japanese Zoos, 1991” by your writer appeared in the No. 243 (1993) of the *International Zoo News*, thus inaugurating a series. The purpose of the series was to portray a popular zoo animal group on an annual basis from this isolated country not well understood by the outside world. The initial installments simply focused on statistics of the animal group, be it a mammal, bird, amphibian or reptile, on the collection status, trend, breeding and longevity, to provide a snapshot across zoos (and aquariums) in a particular year. Gradually photos were added, and topics expanded to include aspects on husbandry, history and conservation status. Times have changed, however.

JAZA’s animal inventory of animals includes all animals kept by the member institutions, and it provided the major body of information for the series, in addition to other segments of the JAZA annual report. In recent years, the publication of the inventory lagged chronically. After receiving the inventory data compilation began, and by the time an article was published, data were already several years old. Adding to the frustration, a major change was made in the format of the inventory. Constructing a simple list of animals, as in Table I, now became a more time-consuming task, requiring meticulous searching through a sea of institutional data sets. Moreover Mr. Akiyoshi Nawa of Tokyo, a long-time friend who provided photos for the series, is in failing health; I can no longer jot down a note to ask him for new photos. All these pile up, and after a quarter of a century of authorship, a decision had to be made to “hang up the hat.” Regrettably, I know of no colleague who is bi-lingual with Japanese and familiar with the zoo world, who would compile a report on zoos and animals of Japan for a Western zoo periodical on a continual basis.

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References

- Imaizumi, Y.** (1960): Coloured Illustrations of the Mammals of Japan. Hoikusha Publishing Co, LTD., Tokyo. (In Japanese.)
- Itoh, M.** (2010): Japanese Wartime Zoo Policy: The Silent Victims of World War II. Palgrave Macmillan, New York.
- Japanese Association of Zoos and Aquariums.** (2005): *New Husbandry Guidebook: Breeding and Related Material*. Tokyo. (In Japanese.)
- Japanese Association of Zoos and Aquariums.** (2014): *JAZA 2013 Annual Report*. Tokyo. (In Japanese.)
- Kawata, K.** (1994): Pachyderms and Ungulates in Japanese Zoos, 1993. *International Zoo News* 41(8): 5-12.
- Kawata, K.** (2001): Zoological Gardens of Japan. In: Kisling, Vernon Jr., ed. *Zoo and Aquarium History: Ancient Animal Collections to Zoological Gardens*. CRC Press, Boca Raton, Florida, pp. 295-330.
- Kawata, K.** (2005): Delight for Shogun, Gift from Nehru: History of Traveling Menageries of Japan. *Bandwagon* 49(6): 44-53.
- Kawata, K.** (2008): Elephants and Ungulates in Japanese Zoos, 2003. *International Zoo News* 55(8): 452-462.
- Kawata, K.** (2015): Tales from Japan's Zoos: The Sustaining Saga of Sakoku. *International Zoo News* 62(6): 407-421.
- Strehlow, H.** (2001): Zoological Gardens of Western Europe. In: Kisling, Vernon Jr., ed. *Zoo and Aquarium History: Ancient Animal Collections to Zoological Gardens*. CRC Press, Boca Raton, Florida, pp. 75-116.
- Takashima, H.** (1986): *Animal Tales*. Yasaka Shobo, Tokyo. (In Japanese.)
- Takizawa, A.** (1986): *The Record of Okazaki Zoo*. Private publication, Kyoto. (In Japanese.)
- Tennoji Zoo.** (1985): *70-Year History of Osaka Tennoji Zoo*. Tennoji Zoo, Osaka. (In Japanese.)
- Tokyo Zoological Park Society.** (2008): *50-year History of Tama Zoological Park*. Tokyo Zoological Park Society. (In Japanese.)
- Ueno Zoo.** (1982): *The 100-year History of Ueno Zoological Gardens*. Tokyo Metropolitan Government. (In Japanese.)
- Zootier.de.** 2014. www.zootierliste.de/en/

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