12 Zoological Gardens of China

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12.1 INTRODUCTION

"China, land of zoological gardens" is the title of an itinerary originally published in 1965 by the Canadian zoo proprietor and director Al Oeming (1925–2014) in the German animals monthly *Das Tier*. Oeming was the first North American zoo director permitted to tour "Red China" since the proclamation of the People's Republic of China (PRC) in October 1949. For a month in late Autumn 1964, he was shown round four (of roughly 30 existing) zoos between Beijing and Guangzhou. Local governments were investing heavily, Oeming learned, in establishing new zoological gardens in major cities across a country looking back at over three thousand years of keeping wild animals in captivity.[1] Fifteen years earlier, only five zoos and one aquarium had survived the Second Sino-Japanese War (1937–1945) and the subsequent Chinese Civil War (1946–1949). By the time of its thirtieth anniversary, the PRC counted 90 zoos with at least 500 animals each.[2] Currently, the nation boasts approximately 300 zoological gardens, safari and wild animal parks; two-thirds are members of the Chinese Association of Zoological Gardens (CAZG).[3] In addition, China counts at least 200 public aquariums,[4] including 60 marine animal parks,[5] of which about 50 are members of the Chinese Aquarium Association.[6] Only three facilities in the PRC are members of the World Association of Zoos and Aquariums (WAZA), and two of these are located in Hong Kong. Two more Chinese member institutions can be found outside the PRC in the Republic of China, that is, Taiwan,[7] while two zoos in Hong Kong and four Taiwanese zoos and a second aquarium are members of the Southeast Asian Zoos and Aquariums Association (SEAZA).[8]

China, with or without Taiwan, is a huge country, the fourth-largest and the most populous in the world and one with great biodiversity. When the founder of the Zhou dynasty, Wen Wang (*r.* 1056–1050 BC), established the first game park for which we have a literary reference near the newly founded residence Feng (modern Xi'an, capital of Shaanxi province),[9] the surrounding Wei River basin was home not only to tigers (*Panthera tigris*), leopards (*P. pardus*) and three species of bear.

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The cradle of Chinese civilization was also a habitat for the Asian elephant (*Elaphus maximus*), the hairy rhinoceros (*Dicerorhinus sumatrensis*) and the now extinct aurochs (*Bos primigenius*) and short-horned water buffalo (*Bubalus mephistopheles*).[10] In 2004, archeologists discovered skeletal remains of a hitherto unknown species and genus of ape, the North China gibbon (*Junzi imperialis*), in a suburb of Xi'an in a tomb menagerie attributed to the Qin dynasty royal concubine Xia Ji (*c.* 300–*c.* 240 BC).[11] Nowadays, the largest wild mammal that one can encounter in the Wei River basin is the Shaanxi hare (*Lepus tolai filchneri*).

Few if any countries have suffered greater environmental degradation over the past centuries, accelerated during the last decades, than China.[12] The PRC was the first country in the twenty-first century to tolerate the extinction of a large endemic and iconic animal, the Chinese river dolphin (*Lipotes vexillifer*). The giant Chinese paddlefish (*Psephurus gladius*) soon followed.[13] The population of another goliath of China's and Asia's longest river, the Yangtze giant soft-shelled turtle (*Rafetus s. swinhoei*), the world's largest freshwater chelonian, has been reduced to a single male centenarian in a zoo in Suzhou in Jiangsu province.[14] Zoological gardens and game parks in China have become last resorts for a beleaguered endemic fauna.

12.2 LATE IMPERIAL CHINA, 1644–1911

One of the world's oldest civilizations, China has featured what in hindsight could be called zoos since the Shang dynasty of the second millennium BC (see Chapter 1, Kisling, "Ancient Collections and Menageries"). Throughout most of Chinese history, however, menageries and game parks were royal or at least private in character, inaccessible to the public. Townspeople curious to see exotic wild animals usually had only two options: the local bird or pet market,[15,16] and the local wet market selling live alien animals for their meat.[17] Traveling menageries were apparently unknown even in modern China, perhaps because of the distances between population centers and, until recently, internal insecurity and poor roads.

The Qing period (1644–1911) was the last of 15 dynastic epochs in traditional Chinese historiography. Dominated by an ethnic minority from the Northeast, Jurchen Manchus, the dynasty initially was one of the nation's most expansive and inspiring: China's current borders are largely a creation of the Qing (pronounced, roughly, "Tsing"). Corruption and a series of natural disasters and regional revolts, however, exasperated by foreign colonial interference, led to incessant instability and a gradual decline of the imperial order during the nineteenth century and finally collapse in the early twentieth.[18] Zoological gardens, in the modern sense of the term, and public aquariums, like museums and botanical gardens, thus came relatively late to China.[19]

12.2.1 Palace and Temple Menageries

The Qing dynasty inherited the capital Beijing from its predecessor, the Ming (1368–1644), and with that a small imperial menagerie in the northwestern corner of Huangcheng, the gated ward surrounding the imperial palace complex known in English as the Forbidden City. Obviously neglected during the insurrection and invasion that brought down the Ming dynasty, the first emperor of the Qing liquidated what was left of the collection in favor of a lamasery.[20] Known as Hucheng (literally, Tigertown), the menagerie's name survived, however, in the designation of a short street (Hucheng Hutong) into the 1950s.[21]

Northwest of Beijing in Yuanmingyuan, at 3.4 square kilometers (840 acres) the largest and most magnificent of originally eight Summer Palaces laid out during the early Qing period, the emperor Qianlong (*r.* 1736–1796) recreated Hucheng as a tiger pit approximately 25 meters (80 feet) square with brick walls six meters (20 feet) high, ascended by a ramp and partly shaded by a roof. A half-hour stroll through the park took one to a huge man-made lake full of rare varieties of ornamental fish and lined by menagerie cages. A pheasantry designed in European Rococo style by the resident Italian artist Giuseppe Castiglione (1688–1766) stood nearby. Yuanmingyuan was systematically

destroyed and the animals shot or beaten to death by British and French troops during the Second Opium War (1856–1860).[22]

The grounds of temples and monasteries have always served as havens for vulnerable species in otherwise deforested areas, but seldom held exotic animals.[12] A curious if evidently short-lived exception was instituted in Chinese Outer Mongolia in 1905 by the 13th Dalai Lama (1876–1933), living in exile from late 1904 until mid-1909 in Urga, the holiest city of Tibetan Buddhism outside Tibet.[23] Through an Austrian agent of the Dalai Lama, the Hamburg-based animal dealer Carl Hagenbeck (1844–1913) received an order for zebroids trained to pull a carriage, as well as a large assortment of monkeys and birds, particularly psittacines. Accompanied by two keepers, delivery was successfully fulfilled a year later by railway via Moscow to Ulan-Ude and thence overland to Urga (today's Ulaanbaatar).[24] Hagenbeck relied on logistics honed five years previously when importing from China western Europe's first Mongolian wild horses (*Equus przewalskii*), captured by local horsemen and collected by two transport agents near Khovd in Outer Mongolia. Rare then and presumed extinct in the wild since the 1960s, the wild horses acquired by Hagenbeck became the ancestors of most specimens now living in zoos—and even in nature reserves in Mongolia and China.[25]

12.2.2 Imperial Game Parks and Early Wildlife Conservation

Carl Hagenbeck's successful import of Mongolian wild horses was stimulated by an advance order from Herbrand Russell (1858–1940), 11th Duke of Bedford, one of the earliest active conservationists in Europe. To establish a breeding stock, he purchased twelve of Hagenbeck's 28 wild horses, all of which had survived the journey, for his private game park at Woburn Abbey, Bedfordshire.[26] Hagenbeck and the London-based animal dealer William Jamrach (1844–1923) had earlier, between 1894 and 1901, been commissioned to purchase from various European zoos all propagable specimens of another unique, large and virtually extinct species of Chinese ungulate: Père David's deer (*Elaphurus davidianus*). Concentrated at Woburn Abbey, the world herd of the elaphure, as the species is also known in English, grew from 21 in 1901 to 72 in 1913 and 244 in 1947. Today the world population counts over 5,000 head—and all of them descend from a single hart and two hinds presented by Chinese authorities to the Berlin Zoological Garden in 1876[27,28] (Figure 12.1).

FIGURE 12.1 The trio of Nanyuan elaphures sent to Berlin Zoo in 1876. Wood engraving in *Illustrated Sporting & Dramatic News*, 13 October 1877, p. 96. Courtesy of Ulrich Schürer.

Game parks in imperial China, as elsewhere, were usually either larders for venison, hunting grounds for sport or fields for military equestrian exercises—not characteristics associated with a good zoo. They could, however, become refuges for endangered species. During the Qing dynasty's heyday, over a hundred were spread across northeastern China.[29] Historically, one game park just south of Beijing became particularly important for wildlife conservation. The park in which the French missionary and naturalist Armand David (1826–1900) was to become the first European to spot a species of deer until then unknown outside China and subsequently named after him, was known alternatively as Nanyuan (Southern Park) or Nanhaizi (Southern Marshes or Lakes). Established by the Yuan dynasty (1271–1368) and expanded by the Ming, its northern wall ran parallel to and was less than three kilometers (two miles) south of the southern city wall of Beijing.[20] As an imperial retreat, Nanyuan was off limits to foreigners, but bribes could grease clandestine access. The German zoologist and diplomat Otto Franz von Möllendorf (1848–1903), who had helped to organize the transfer of Père David's deer from Nanyuan to Berlin in 1876, was one of the few eyewitnesses to have published details before the park was washed away by unusually severe floods in 1890: Enclosed by a perimeter wall three meters (ten feet) high, punctured by nine gates, Nanyuan encompassed over 500 square kilometers (200 square miles) of largely level ground irrigated by several small streams. A hunting lodge, several picturesque temples and barracks were concentrated near the northern wall, and military colonists had been settled in two small villages near the center. Most of the park was steppe, groves being concentrated around temples and the two villages. Nothing seemed to justify the old name, "Southern Marshes." Yet the park was the last habitat of an otherwise long extinct deer that had evolved to thrive best in marshes. Möllendorf espied only one herd of approximately 150 elaphures grazing near water. The only other large mammals he (and a decade earlier, David) were able to observe were a few Manchurian red deer (*Cervus elelaphus xanthopygus*) and Mongolian gazelles (*Procapra gutturosa*).[30] The few large game animals that had survived the great flood were slaughtered for their meat during the Boxer Rebellion a decade later.[20] Thirteen kilometers (nine miles) directly south of the Forbidden City, the flat and treeless core of the wasted game park was converted in 1910 into China's first airport.[31]

Berlin's zoo was only the third to acquire specimens of Père David's deer directly from Nanyuan. The first pair was secured for the Gardens of the Zoological Society of London in 1868 by the legation minister Rutherford Alcock (1809–1897) and arrived in Britain in August 1869. The Ménagerie du Muséum National d'Histoire Naturelle in Paris received three specimens in 1870, but they did not survive the siege of the capital during the Franco-Prussian War (1870–1871) that broke out soon after. The Ueno Zoological Gardens in Tokyo acquired a pair in 1888. Although the elaphures in Japan bred successfully, the line apparently died out by 1906. The original specimens of London and Paris never produced young.[27]

East of Nanyuan Airport, the old game park was reconstituted in 1985 on 68 hectares (168 acres)—a fraction of the original acreage—as the Nanhaizi Milu Park. The 14th Duke of Bedford, Robin Russell (1940–2003), donated 22 *milu*, as Père David's deer is known in China, to establish a new breeding stock.[32] Through the genetic bottleneck of only three specimens sent from Beijing to Berlin a century earlier, descendants of the last elaphures in Nanyuan returned to their roots. Père David's deer was the first species saved from extinction by zoos.

12.2.3 The First Chinese Zoological Gardens

China's oldest zoo (and botanical garden) is the Hong Kong Zoological and Botanical Gardens (Xianggang Dongzhiwugongyuan) in the heart of Central, Hong Kong Island. Founded in 1861 and inaugurated three years later, the 5.6-hectare (14-acre) park was initially called simply Public Gardens, and animal exhibits came only later. With the appointment of the horticulturalist Charles Ford (1844–1927) as superintendent and Government botanist in 1871 and the systematic development of botanical attractions and an herbarium, the park, supported by the Royal Botanic Gardens, Kew, became known for a century as the Hong Kong Botanic Gardens. The current name was

bestowed upon the site only in 1975. The first aviaries and mammal enclosures, however, were built as early as 1876, although they never featured prominently in the Gardens' public perception.[33] Although the zoo and botanical gardens were founded during the Qing period, strictly speaking they were a British, not a Chinese, creation. The island of Hong Kong had been ceded "in perpetuity" to Great Britain in 1843 following China's defeat in the First Opium War (1839–1842) and only returned in 1997. Throughout the British empire, colonial botanical gardens frequently featured menageries, even if that would never be reflected in the gardens' names.[34,35] Today, although pleasant and well-tended, Hong Kong's small menagerie remains the least interesting zoo of any megacity in China, and no structures survive to indicate its long history.[36]

China's first zoo to call itself, in English, "Zoological Gardens" was established downriver from Shanghai near Wusong in 1888. A joint-stock company was formed to finance the foundation of the Chinese Zoological Gardens, as the new zoo was officially baptized, with an initial capital of 150,000 Shanghai taels,[37] the equivalent in current purchasing power of perhaps US$5 million.[38] Although the owners were Chinese compradors, an Englishman, a Mr. Frame, was appointed superintendent.[39] The German entomologist Adalbert Seitz (1860–1938), later director of the zoo in Frankfurt am Main, published an insightful if disenthralled description three years after incorporation:

> The zoological garden of Shanghai doesn't really deserve its name. It is a public place of amusement exhibiting some animals, and its collection hardly compares even to that of many [European] menageries. Nevertheless, the place is not without interest, as is everything in China.

The layout reminded him of an English, not a Chinese, garden, with winding footpaths bordered by flower beds. The center was dominated by a large teahouse; the animal collection was concentrated in a large hall nearby with high ceilings but cages not larger than those of a traveling menagerie set along a wall 60 paces long. If what Seitz had been told by resident Europeans was correct, the original stock of animals, which did include an Indian elephant and an African lion, had been purchased (and overpaid for) from a circus. The company was soon insolvent as the zoo was inconveniently located: the ride out in a carriage, for example, alone consumed at least an hour.[40]

Beijing's "only nucleus of a zoological garden" is how the German sinologist and diplomat Carl Arendt (1838–1902) once described the vast, fifteenth-century complex of stables for ceremonial elephants southwest of the Forbidden City known as Xiangfang (Elephant Quarter).[41] For 400 years it was a popular spectacle to observe elephants march "to work" to nearby Tiananmen and back or watch their keepers take them for a bath (weather permitting) in the adjacent canal or nearby moat.[20] By the time Arendt left China for good in 1887, however, the last elephant had died of starvation: "the preferred method of the Chinese to rid themselves of unwanted colossuses too big to dispose of elegantly."[41] The Second Opium War and particularly the devastating Taiping Rebellion (1850–1864) made many rituals seem superfluous.

Two decades later, Beijing did get its zoological garden, ultimately the only successful one founded by the Qing dynasty. Northwest of the capital about 1.5 kilometers (almost a mile) outside Xizhimen (Western Gate) on the road to the Summer Palaces, the Beijing Zoological Gardens, as the zoo now prefers to be officially known in English,[42] first opened its gates to visitors in June 1908. The initially 70-hectare (175-acre) site absorbed Leshanyuan and Jiyuan, two imperial gardens created in the mid- and late eighteenth century originally for sons of the first and second emperor, respectively, of the Qing dynasty. Strictly speaking, the new zoo (*dongwuyuan*, literally, animal garden or park) was at first only one of many elements of the Ministry of Agriculture, Industry, and Trade's Agricultural Research Farm (Nongshi Shiyanchang) founded in 1906—and a very small one at that, encompassing only 15,000 square meters (3.7 acres). More menagerie than zoological garden (contemporary maps referred in English to the "Menagerie"), the *dongwuyuan* was during its early decades largely restricted to an island accessible over two, later three, bridges in the southeastern corner of the Research Farm that would be subsumed a half-century later into the expanded zoo.[43] The Farm, which also included botanical and horticultural gardens and a breeding station for silkworms, was for

FIGURE 12.2 The main gate to the Agricultural Research Farm, now Beijing Zoo, about 1911. Courtesy of University of Bristol, Historical Photographs of China, William Cooper Collection.

all practical purposes the first public park in the capital accessible to *laobaixing*, the common folk. Teahouses, foreign-style cafés and restaurants were distributed around the grounds. The entrance fees were high enough to keep out the riffraff, but under the Qing Beijing's many other gardens and parks were reserved for the privileged.[44] Within the foreign community of Beijing, the Farm as a whole was conventionally known as the "zoological gardens,"[45] or simply the "zoo"[46] (Figure 12.2).

The suggestion to create a zoo as a feature of the Research Farm was made by Duanfang (1861–1911), a Chinese-Manchu viceroy and founding commissioner of the Bureau of Agriculture, Industry, and Trade, the predecessor of the Ministry. Induced by the empress dowager Cixi (*r.* 1861–1908), he had shepherded a commission of five special ministers on a six-month fact-finding tour visiting modern institutions in Japan, the US and Europe in 1905 and 1906. Once in Germany, Duanfang and colleagues spent most of the fifth day in Berlin's zoo, the world's largest at the time in terms of species diversity. A month later in Hamburg, the ministers called on Carl Hagenbeck, inspecting his new and innovative zoological park then under construction.[47] Cixi, de facto head of state, was enthusiastic about the idea of a zoo. China's first zoo director, Deng Chengzhang, was undersecretary in the Ministry of Agriculture at the time and a member of the Manchu Eight Banners, the elite army reserve of the Qing empire. Presumably he was appointed head of the Farm at the proposal of Duanfang.[48]

The original stock of Beijing's new zoo was ordered the following year from Hagenbeck at a total cost of 76,566.55 goldmarks,[49] the equivalent, roughly, of €500,000 (US$550,000) today.[50] In April 1907, the animal dealer delivered through the nearby port of Tianjin a Noah's ark of 80 mammals, mostly in pairs, representing 38 species and 47 birds embodying 18 species. A tame Indian elephant cow at 7,000 goldmarks was the single most expensive animal.[49] Donations from around China brought in native animals, including a pair of Tibetan mastiffs to add to the three dog breeds imported from Germany. Freaks such as a horse with eight hooves and an ox with five legs were popular exhibits. Altogether, the menagerie started out modestly with around 700 animals representing some 80 species.[51] Circumstances beyond the control of management soon sent the zoo into a slow and almost fatal decline.

12.3 REPUBLIC OF CHINA, 1912–1949

The creation of the Agricultural Research Farm was one of the last but ultimately futile efforts of the Qing regime at modernization and reform. A revolution ignited in Wuhan in October 1911 brought

down not only the dynasty but the entire imperial order; the last emperor of China abdicated on 12 February 1912. The new Republic of China, however, was initially a united country only on paper: individual militias, led by warlords, soon divided control of the nation between themselves, when not fighting each other over territory. Outer Mongolia declared independence in December 1911; Taiwan had become a Japanese colony in 1898. Genuine consolidation of the rest of the country was only achieved in 1926–1928, after an army in southern China dominated by the Guomindang under party leader Chiang Kai-shek (1887–1975) succeeded in either overwhelming or integrating the units further north. The Guomindang removed the seat of government to Nanjing and renamed the former capital Beiping. A decade later, the Japanese invasion of the Chinese heartland precipitated the Second Sino-Japanese War. The civil war that broke out between the Guomindang and the Communist party led by Mao Zedong (1893–1976) a year after their joint victory (with American help) over Japan ended in defeat for Chiang and his armed forces in 1949 and their flight in exile to Taiwan.[52]

12.3.1 Zoological Gardens in an Era of Turmoil

Beijing's Agricultural Research Farm, which by now also included an entomological and a zoological museum, initially kept its name under a progression of five new directors within the decade. Unemployed since the fall of the Qing, four giant eunuchs over 2.2 meters (seven feet, four inches) tall were hired as gatekeepers. They soon became the main attraction of a zoo that was rapidly losing its animals to neglect and funding shortages.[45,53] In 1929, with the Jardin des Plantes of the Muséum National d'Histoire Naturelle in Paris serving as model, the Agricultural Research Farm was reorganized and renamed National Beiping Museum of Natural History (Guoli Beiping Tianran Bowuyuan). Finances remained inadequate, however; the library of the National University of Beiping had an annual budget twice as large, just for book purchases.[54] Without public feeding, many animals would have starved to death; the sole elephant did, in 1937, the year of the Japanese invasion. Requisitioned by the Japanese army early in 1945, the site, after liberation, was reopened as a park two years later, but by the end of the Republic in 1949 the animal collection had been reduced to a giant salamander (*Andrias* sp.), a lynx (*L. lynx*), a reindeer (*Rangifer tarandus*), a dozen Taiwan macaques (*Macaca cyclopis*), an emu (*Dromaius novaehollandiae*), a turkey (*Meleagris gallopavo*) and three species of parrot.[43]

China's second-oldest existing zoo and the first to be established during the Republican era is the Qingdao Zoological Garden. For one and a half decades, until the outbreak of the First World War, Qingdao had been a German colony carved out of Shandong province, growing quickly from a small fishing harbor into a major commercial and naval port.[55] Three years after the establishment of the colony, an arboretum was laid out on roughly 100 hectares (250 acres) of hilly ground northeast of the town; in 1912 the arboretum became a public and deer park known as Forstgarten (Forest Garden).[56] Between late 1914 and late 1922, Qingdao was occupied by Japanese forces; Forstgarten was renamed Rising Sun Public Park (Xu Gongyuan). In 1915, a small zoo devoted to native animals was established on the twelve hectares (30 acres) of park closest to the urban center. The park was renamed four times during the Republican era; in the 1930s modest investments were made in new zoo enclosures, but only a handful of animals survived the end of the Republic. The zoo became independent of what is now Sun Yat-sen Public Park (Zhongshan Gongyuan) only in 1977, after it was rebuilt on 28 hectares (70 acres) at the north end of the park.[57]

In 1921, a small zoo was established within a 17-hectare (42-acre) public park in Baoding, capital of Zhili (modern Hebei) province, in the shadow of the old city walls near the South Gate. In 1953, the park was subsumed into an enlarged zoo, becoming the Baoding Zoological Garden (Baoding Dongwuyuan).[58] Since 1933, a small zoo covering seven hectares (17 acres) graces Sun Yat-sen Public Park in Yinchuan, capital of Ningxia province.[59] Only one other, albeit innovative, zoo founded during the Republican era still survives.

Changchun has been the seat of the provincial government of Jilin since 1954, but from 1932 until 1945 it was more: the "imperial" capital of Manchukuo. A colony disguised as an "empire,"

Manchukuo was created out of the amalgamation of Manchuria with eastern Inner Mongolia after the Japanese occupation of northeastern China north of the Great Wall in 1931. The occupation authorities renamed Changchun Xinjing (New Capital) and subsequently proceeded to transform the nondescript but centrally located railway hub into Asia's newest and most modern metropolis.[60] A zoo was considered an essential feature of a showcase capital. The Xinjing Zoological and Botanical Gardens (Xinjing Dongzhiwuyuan) were allocated 72 hectares (178 acres) just south of the new government district, and construction began in 1938. Koga Tadamichi (1903–1986), director of Ueno Zoo in Tokyo, served as senior advisor, and he suggested Nakamata Mitsushi (1904–1975), director of the municipal zoo in Sendai, as chief executive. With Hamburg's Tierpark Hagenbeck serving explicitly as antetype, the concept of the new zoo was to provide, in the words of Nakamata, "views of nature previously unseen in zoological gardens." Botanical greenhouses, an aquarium, and a reptile house were designed to complement the "ideal Manchurian landscape."[61] The zoo and botanical gardens were officially inaugurated in 1942, but many of the envisioned exhibits remained uncompleted before the end of war in 1945.[62] After liberation, Xinjing reverted to its old name, and for decades Chinese authorities were caught in a quandary: what's to be done with largely undamaged but unwanted monumental buildings of an imposed capital? The zoo, being too much a Japanese contrivance, was reduced to a public park with a paddock here and a pen there, and the site upgraded and renamed Changchun Zoological and Botanical Gardens (Changchun Dongzhiwuyuan) only in 1987.[63]

12.3.2 China's First Aquariums

"The aquarium is essentially a Chinese invention," the French biologist Gustave Loisel (1864–1933) observed in his monumental history of zoos published over a century ago. Its purpose "was to keep their goldfish in captivity, of which a hundred varieties have been created, each as beautiful and as odd-looking as the next."[64] The earliest literary references to ponds stocked with goldfish (*Carassius auratus*) date from the mid-eighth century; earthenware and porcelain basins to hold new varieties of goldfish too delicate for year-round outdoor accommodation are known from the sixteenth century onwards. Since the Song dynasty (960–1279), networks of goldfish ponds crisscrossed by promenades were a popular feature of wealthy cities in the lower Yangtze region until their destruction during the Taiping Rebellion.[65,66] Further north, Beijing's Jinyuchi (literally, Goldfish Ponds) was an eight-hectare (20-acre) market for ornamental fish and paraphernalia, established during the Ming period just north of the Altar of Heaven (Tiantan). The huge park around Tiantan itself became accessible to the public after the proclamation of the Republic, but until the outbreak of the Second Sino-Japanese War Jinyuchi remained a popular destination for evening strolls.[67]

The first public aquarium, in the modern sense of the term, was established in Dalian, the major port of Manchuria, by the Japanese entrepreneur Hirata Hōtei in 1928. Dalian at the time, along with the nearby naval port of Lüshun, constituted the core of Chinese territory at the southern end of the Liaodong peninsula "leased" to Japan in 1905. The aquarium, just south of a prominent beach hotel, was known as Hoshigaura Suizokukan (Xingpu Shuizuguan in Chinese, literally, Star Beach Aquarium).[68] Hirata, originally a watchmaker, opened at roughly the same time an aquarium in Yokohama; an effort to establish one in Shanghai in 1930 fell through as his Yokohama engagement was forced into liquidation. As a tourist attraction in an area otherwise poor on recreational options, Hoshigaura Aquarium initially thrived and served as a template for what is now China's oldest extant aquarium, in Qingdao[69,70] (Figure 12.3).

Qingdao Aquarium (Qingdao Shuizuguan) was founded on the initiative of the Science Society of China in 1931 and inaugurated the next year. It was the largest in Asia at the time, constructed as a Chinese pavilion at the foot of a steep hill ending just short of a bay leading out into the Yellow Sea. The ground floor was allocated to the public galleries: three large circular fish tanks in a courtyard flanked by 18 display cabinets devoted to marine biology.[71] The annual budget was financed to 55 percent by gate receipts, the balance being subsidized by the city. Unlike Hoshigaura Aquarium,

FIGURE 12.3 Qingdao Aquarium in the year of its inauguration, 1932. Photograph in *China Journal*, November 1932, opposite p. 244. Author's collection.

a blatantly profit-oriented enterprise, Qingdao Aquarium was a non-profit educational institution. China's first aquarium director, the meteorologist Jiang Bingran (1882–1966), came from Qingdao Observatory. In December 1936, National Shandong University's Institute of Marine Biology, China's oldest, was completed on a site adjacent to the aquarium with the financial support of both the aquarium and the observatory.[54] Whereas the aquarium in Dalian disappeared with the occupying Japanese by 1945, Qingdao Aquarium survived largely unscathed through two wars.

12.3.3 Enter the Panda

Aside from the dragon, no animal is more closely associated with China today, or adulated, than the giant panda (*Ailuropoda melanoleuca*). This is a surprisingly recent phenomenon. Although the giant panda was one of three species of bear characteristic of the Wei River basin 3,000 years ago, and thus familiar to Chinese society early on, the *baixiong* (white bear) played an almost nonexistent role in Chinese culture until its "rediscovery" as a conservation icon in the 1950s. Thriving best in impenetrable bamboo forests, neither its meat nor its fur compared favorably to those of brown or black bears among Chinese consumers—or even poachers.[72] Of China's four native species of bear, only the Asian black bear is identifiable at all in pre-modern Chinese art.[73] No evidence, neither archeological nor literary, exists to suggest that giant pandas were ever held in ancient or medieval menageries or game parks, although, despite the animal's unusual dietary requirements, it is not inconceivable.

The giant panda was one of over 240 species of animal or plant discovered for Western science by Armand David between 1866 and 1874.[74] He acquired his first two giant pandas, alas dead, from hunters near Ya'an, Sichuan province, in March 1869 and described them as representative of a "new" species: *Ursus melanoleucus* (literally, black-and-white bear). Recognizing osteological similarities with the red panda (*Ailurus fulgens*, the panda *per se* until the discovery of the giant panda), the mammalogist Alphonse Milne Edwards (1835–1900), to whom in Paris David had sent his material, placed the species in a new genus, *Ailuropoda* (panda-foot) and reclassified the vegetarian carnivore as a giant procyonid. A century-long controversy ensued: was the giant panda a panda-like bear or a bear-like panda? On the basis particularly of the remains of Su Lin, a giant panda acquired by the Chicago Zoological Park in 1937, the anatomist Dwight Davis (1908–1965) at the Field Museum of Natural History determined to the satisfaction of most taxonomists that the giant panda is indeed a bear.[75] But the name "giant panda" stuck.

Su Lin was the first giant panda captured for a zoo—and the zoo that profited from it was in America, not China. Perhaps just as remarkable, success was achieved by a young and inexperienced but resolute New York fashion designer, Ruth Harkness (1900–1947), the widow of the financially independent adventurer William H. Harkness (1902–1936). In 1934, he had provided the New York Zoological Park with Komodo dragons (*Varanus komodoensis*) captured in what is now Indonesia. For his next adventure, Harkness teamed up with the Shanghai-based American animal dealer Floyd Tangier Smith (1882–1939), determined to acquire for New York a live giant panda. Until then, outside China the species was only represented by less than a dozen museum specimens. Harkness had the money, Smith the experience and networks, but the New Yorker died of cancer in February 1936 before they could really start. With her inheritance but without her husband's partner, Ruth Harkness took up the challenge, accompanied by an experienced if young Chinese hunter and guide, Yang Dilin (1914–2008), known to foreigners as Quentin Young.[76]

Striking out together from Shanghai for western Sichuan by river boat, motor-car and, towards the end, escorted by local coolies on foot, within a week of arrival in giant panda haunts reconnoitered by her late husband's partner Smith, Harkness and Yang "stumbled" over a roughly two-month-old giant panda in the hollow of a tree with its mother nowhere in sight.[77] Smith was convinced that in fact the specimen had been poached from one of his camps, but whatever the merits of his complaint the childless Harkness proved to be an extraordinarily adept *Ersatzmutter*. She brought the infant giant panda safely first to Chengdu and then by air to Shanghai and an ecstatic media reception. Assumed to be a female (an assessment only corrected two years later after a lethal accident and an autopsy), the giant panda was christened Su Lin in honor of Yang Dilin's sister-in-law. Disguised as "one dog, $20," China's now most coveted animal was smuggled out of the country by Harkness on board the *President McKinley*, arriving to a fresh media spectacle in San Francisco shortly before Christmas 1936. Harkness and the New York Zoological Society could not agree on a price, and the two-year-old Chicago Zoological Park intervened to acquire Su Lin for US$8,750, more than four times what New York would offer and enough to finance Harkness' next expedition back to China. A year later, dodging the war that had since broke out, she returned to Chicago with a second infant giant panda named Diana, after Yang's new wife, although the specimen, later renamed Mei Mei (Little Sister), eventually proved to be a male as well.[76]

New York finally received its first giant panda, a young female named Pandora, in June 1938. The specimen had been purchased from a native hunter by an American professor at a private Protestant university in Chengdu and presented to the New York Zoological Society, this time with the Chinese government's blessing, in exchange for "donations" to the university's science program. Floyd Tangier Smith would finally succeed in bringing to Europe one young and four adult giant pandas, arriving in London, via Hong Kong, on Christmas Eve 1938. Altogether, 14 giant pandas were exported from China between 1936 and 1941, ending up in two zoos in England and three in the USA. Smith claimed in 1939 that he had provided Chinese authorities, in exchange for export permits, with "the first [two] live specimens in the Chinese zoological gardens."[78] If true, they apparently never reached their intended destinations—hardly surprising as all but one of China's dozen zoos at the time lay in Japanese occupation zones, and Yinchuan, the lone exception, certainly received none.

12.4 PEOPLE'S REPUBLIC OF CHINA, 1949–2021

The Communist revolution led initially to a conspicuous blossoming of municipal zoological gardens throughout the new republic. The nihilistic Great Proletarian Cultural Revolution (1966–1976) launched by Mao Zedong to purge the Party and society of putative traditional and liberal elements targeted academics and intellectuals but not necessarily zoologists or zookeepers. The decade of Maoist mischief led largely to stagnation among the country's zoos, but research on giant pandas and three species of snub-nosed monkey (*Rhinopithecus* spp.), remarkably large and beautiful primates also endemic to China, as post-Revolutionary icons, and with that zoo biology, continued

to be promoted.[72] Economic liberalization in the 1980s and 1990s, following Mao's death and the marginalization of his most die-hard supporters, paved the way for new, privately funded, profit-oriented suburban zoological and safari parks, as well as aquariums and oceanariums. After the turn of the century, many of the private zoos and aquariums became unprofitable or were shut down by local governments for security or animal welfare violations.[79]

12.4.1 New Zoos for a New China

After 14 years of almost incessant warfare, only Beijing, Qingdao, Baoding, Yinchuan and Changchun had zoos—or what was left of them—in 1950. In the national capital, Beijing again, what had initially been an agricultural research institution with a menagerie and then a natural history museum campus was converted into a municipal park and renamed Western Suburbs Public Park (Xijiao Gongyuan) in March 1950. The grounds, however, soon evolved into a zoological park encompassing the entire site. In 1954, a zoologist, Cui Zhanping, was appointed director for the first time. The transformation was confirmed by a fresh name change to Beijing Zoological Gardens (Beijing Dongwuyuan) in April 1955. In 1950, 633,000 visitors had been counted in the park; since 1953, attendance has dropped only once below three million, frequently topping ten million during the 1980s.[43]

By the end of the first decade of the PRC, new zoos had opened in Hengyang and Tianjin (1952); Chengdu, Chongqing, Kunming and Wuhan (1953); Haikou, Nanjing and Suzhou (1954); Shanghai and Guangzhou (1955); Fuzhou and Xi'an (1956); Changsha, Lanzhou and Taiyuan (1957); Guiyang, Hangzhou and Ürümqi (1958); Harbin and Ji'nan (1959); and Xining (1960). All but two of the locations are either provincial capitals or metropolitan areas with provincial status. Many of the new zoos were originally segments of larger public parks, and the animal collections of several smaller zoos were years later removed to larger, purpose-built sites in the suburbs: in Chengdu, Hangzhou, Nanjing, Suzhou, Tianjin, Wuhan and Xi'an, for example. Although each zoo differed in size and character, they all shared a common concept of exhibiting a balance of Chinese and exotic animals in traditional taxonomic display.[63] The largest and most ambitious new zoo outside the capital was Shanghai's, established on the 74-hectare (183-acre) site of a former golf course near the old airport;[80] Maoist China had no use for golf courses. In the 1920s and 1930s, Shanghai had supported two, albeit small, zoos, but neither survived the war years.[81]

Although a municipal enterprise, Beijing Zoo initially functioned as the national zoo: it was the obvious recipient for animal donations from visiting dignitaries, from Ho Chi Minh (1890–1969) and Jawaharlal Nehru (1889–1964) in the 1950s with elephants in tow, to Richard Nixon (1913–1994), who presented the zoo with muskoxen (*Ovibos moschatus*) in 1972.[43] The zoo was the primary exchange for distributing Chinese animals to zoos abroad and for coordinating the distribution of foreign exotic animals within China.[82] A National Zoo Information Network for Scientific Techniques (Quanguo Dongwuyuan Keji Qingbaowang) was established in 1978 to promote cooperation, issuing a yearbook and regular newsletters. The Network was restructured and renamed Chinese Association of Zoological Gardens (Zhongguo Dongwuyuan Xiehui) in 1985, henceforth organizing annual conferences, coordinating studbooks and publishing the journal *Dongwuyuan* (Animal Garden) as well as topical handbooks.[2]

12.4.2 Rare Animal Breeding and Safari Parks

China's oldest safari park, that is, large suburban zoological park with a drive-through component, was established on 120 hectares (300 acres) in Shenzhen on the border to Hong Kong in 1993.[63] Currently, around 50 safari parks (usually called *yesheng dongwuyuan*, literally, wild animal parks) are registered in China.[83] In the greater Beijing area, two safari parks compete with the old zoo for visitors since the turn of the century. During the construction boom in preparation for the Summer Olympics in 2008, municipal authorities seriously contemplated razing the urban zoo, now 86

hectares (213 acres) large, to make room for new tower blocks. Public opinion successfully saved the zoo, not least because the alternative, the safari parks, remain largely inaccessible by public transport and promote attractions that are controversial even in China.[84] One of Beijing's safari parks, for example, initially featured not only the drive-through option and the ubiquitous animal circus but a bullring and a cockpit, and behavioral enrichment can include the feeding of live animals to big cats even today.[85] On the other hand, the commercial Chimelong Group that operates roughly a dozen theme parks and a dozen hotels in the greater Guangzhou conurbation established a safari park in 1997 in the suburb of Panyu on 133 hectares (330 acres) that today sets benchmarks for animal husbandry and breeding. It is the only zoo to date, for example, that has successfully raised giant panda triplets,[86] and it is the only zoo in the PRC outside Hong Kong that is a member of WAZA.[7]

The zoo in Chengdu, capital of Sichuan province, was founded originally as a holding and breeding station for local wildlife, and it was the first zoo in China itself to exhibit, in 1953, a giant panda. The three-hectare (eight-acre), central-city site proved too small for the zoo's purposes, however, and it was one of the first in China to be replaced by a larger facility. In 1976, all animals were transferred to a 17 hectare (42 acre) site adjacent to an ancient Buddhist temple in Chengdu's northern suburbs.[87] Over 60 giant pandas have been raised there since.[88] Less than five kilometers (three miles) further out from the new municipal zoo, as the crow flies, another park devoted exclusively to breeding and exhibiting giant and red pandas was established on 100 hectares (250 acres) in 1987. The Chengdu Giant Panda Breeding Research Base (Chengdu Daxiongmao Fanyu Yanjiu Jidi) started out with six ill or injured, rescued specimens, and from this original stock the Base has produced over 260 offspring. The institution, which since March 2021 also includes a new giant panda museum with over 4,300 square meters (46,000 square feet) of exhibition space,[89] in recent years has attracted over three million visitors a year.[90]

A second suburban panda zoo was inaugurated in May 2021 in Xi'an: the Qinling Giant Panda Breeding Research Center. Among the initial breeding stock of a dozen giant pandas wanders the only captive specimen of a newly recognized subspecies restricted to the Qinling mountain range in southern Shaanxi province.[91] Scientifically described only in 2005, *Ailuropoda melanoleuca qinlingensis* can be distinguished not only by brown pelage substituting black, but also by its comparatively small skull and large molars. The population is estimated to number only a hundred. The first specimen in a zoo, a female that lived for eleven years in the old Xi'an Zoo, was initially considered a freak.[92]

During the first 35 years after the birth of the first zoo-born giant panda in Beijing in 1963, only twelve males and 21 females were bred in captivity, and of these almost half died in their first month.[93] Since 1998, however, over 500 giant pandas have been successfully bred and raised in over 50 zoos and breeding stations. Roughly half of these were the result of artificial insemination, first tested in Beijing Zoo in 1978.[94] Currently, over 630 giant pandas live in approximately 20 Chinese zoos of one kind or another; a dozen zoos outside China hold specimens, mostly "on lease." Nine captive-born giant pandas have so far been released into the wild; the population of genuinely wild specimens is currently estimated at almost 1,900[95] (Figure 12.4).

The giant panda, the Mongolian wild horse, and Père David's deer are only three of almost 600 vertebrate species on China's "List of Wildlife under Special State Protection."[96] Many if not most are represented in Chinese zoos with good breeding records, but the prospects are not equally promising. For example, the only endemic subspecies of tiger, the South China tiger (*Panthera tigris amoyensis*), is represented by approximately 140 zoo specimens that descend from just two male and four female animals captured for the zoos in Chongqing and Suzhou between 1955 and 1970. Inbreeding has apparently harmed the tiger more than Père David's deer; moreover, the Suzhou line was diluted by crossbreeding with different subspecies. In the wild, the South China tiger is presumed extinct, the victim in the 1950s of systematic extermination programs. Another subspecies of tiger once native to Xinjiang and territories west is completely extinct, while the populations of tigers in the border regions towards Russia in the northeast and Burma and India in the southwest are down to their tens. On the other hand, over 200 tiger farms, some open to the public,

FIGURE 12.4 The first giant panda born in captivity, 1963. Mingming with her mother Lili in Beijing Zoo. Undated photograph by Gu Songnian, New China News Agency. Courtesy of the Zoological Society of London.

hold perhaps 6,000 specimens, many hybrids between subspecies, but their primary purpose is to provide the pharmaceutical market with bones and organs deemed effective in traditional Chinese medicine. To date, captive-bred tigers have yet to be reintroduced successfully into their natural habitat, but the real challenge, for tiger conservation and the protection of other nearly extinct species, is to find the space in densely populated China for wildlife habitats that have not suffered irreversibly from pollution and degradation.[97,98]

12.4.3 New Aquariums and Marine Animal Parks

In the early years of the new republic, Qingdao Aquarium remained unique in China; in 1965 it was also the first wild animal collection in the country to exhibit a cetacean, a finless porpoise (*Neophocaena phocaenoides*). Various specimens of the same species were held in a hippopotamus pool in the Shanghai Zoological Park through the 1970s.[99] Several zoos established goldfish houses, but public aquariums only became widespread when privatization was unleashed in the 1990s. Seven commercial aquarium projects were announced for Beijing alone at the beginning of the decade, and three survived. In 1999, the country's largest aquarium up until then, with 42,000 square meters (452,000 square feet) of exhibition space, was completed at a cost of US$95 million. A joint venture of Beijing Zoo with an investment company in Hong Kong, it was built across the way from the new elephant house, catapulting the zoo to the top in terms of species diversity.[100] The zoological highlight of the aquarium soon became a small school of the critically endangered Chinese sturgeon (*Acipenser sinensis*) in what had

originally been the shark tank. Five female gravid sturgeons were captured near Yichang in the upper Yangtze and introduced in 2005.[101] In other fish tanks, however, inexperience during the first one or two years led to high mortality rates of an estimated 300 percent;[100] new aquariums in Guangzhou and Shenzhen were said to suffer initial losses of up to 900 percent in their first year or so. Investors in aquariums that overestimated potential attendance and subsequently became insolvent simply walked away, leaving tens of thousands of aquatic animals to their fate.[102] With consolidation, China's 72 largest aquariums, with a cumulative attendance of 112 million, created revenue of over 7.2 billion renminbi (US$1.1 billion) in 2018.[83]

Over two dozen aquariums and marine animal parks now exhibit cetaceans, and the Beijing Zoo Aquarium is no exception. Between 1978 and 2018, over 1,100 cetaceans representing a dozen species have been captured for Chinese institutions.[5,99] China's oldest marine animal park, or oceanarium, was inaugurated in Hong Kong (at the time still a British colony) in January 1977. A creation of the Hong Kong Jockey Club, Ocean Park Hong Kong (Xianggang Haiyang Gongyuan), now a nonprofit, covers almost 92 hectares (228 acres) at the southern end of Hong Kong Island. Diversifying since 2009, it currently also exhibits giant pandas, golden snub-nosed monkeys, Chinese alligators (*Alligator sinensis*) and other rare animals one would not necessarily expect in an oceanarium. In the local public's perception, Ocean Park has superseded the Hong Kong Zoological and Botanical Gardens as *the* zoo of Hong Kong.[103,104]

The first dolphinarium built in the PRC was the Chinese River Dolphin Aquarium (Baijitun Shuizuguan) of the Institute of Hydrobiology, Chinese Academy of Sciences, in Wuhan, Hebei province. Covering 2.5 hectares (six acres), the original complex was inaugurated in 1980 and rebuilt in 1992. As a research facility, access by the public remains limited, but a museum is open to visitors. One specimen of the now extinct Chinese river dolphin survived for a record 23 years, perhaps the last of his kind, and the dolphinarium now concentrates on cultivating the finless porpoise of the Yangtze River.[105] In 2005, it celebrated the birth of the first finless porpoise ever raised in captivity, and the first specimen itself born to a captive-bred porpoise was successfully nurtured in 2019.[106] A year later, the dolphinarium released the first captive-bred finless porpoise, born 2016, into the wild—more precisely, into a nature reserve along the Yangtze upriver from Wuhan.[107]

The driving force behind China's recent wave of marine animal theme parks (oceanariums with rollercoasters) are investment companies in the tourism industry, particularly Haichang Ocean Park Holdings (with large marine animal theme parks in Dalian, Qingdao, Shanghai and seven other cities, three of them far from the coast), Dalian Sunasia Tourism Holding Co. (Dalian, Harbin and Suzhou) and the Chimelong Group, proprietor also of the Chimelong Safari Park and the Chimelong Bird Paradise (formerly Guangzhou Crocodile Park), both in the Guangzhou suburb of Panyu. A hundred kilometers (62 miles) further south in Zhuhai on the border to Macau, Chimelong Ocean Kingdom (Changlong Haiyang Wangguo) is by several standards the largest marine animal theme park in the world, inaugurated in 2014 after an initial investment of over US$1.5 billion. For enthusiasts keen to see as many different rare aquatic animals in state-of-the-art facilities as is possible at a single site, it is currently probably the greatest aquarium in the world.[108,109]

12.5 TAIWAN, 1895–2021

Taiwan, known in English also as Formosa, Island China and, especially during the heyday of the Cold War, "Free China," is an anomaly both in Chinese history and international law. By the definition in its own constitution, it is the legitimate Republic of China proclaimed in 1912 and simply lost most of its territory to Communist insurgents in 1949. Both Taiwan and the PRC agree that the island is also a Chinese province, detached from Fujian in 1886. After China's defeat in the First Sino-Japanese War (1894–1895), Taiwan was annexed by Japan and only returned to China in 1945.[110] Taiwan's first two zoos, founded in Taipei in 1914 and Hsinchu in 1936, respectively, were thus also Japanese zoos until 1945; the dozen or so other zoos and aquariums on the island were established only after 1949.

The origins of what is now the Taipei Municipal Zoological Park (Taibei Shili Dongwuyuan) go back to a small menagerie founded by two Japanese entrepreneurs, one the proprietor of a circus, on the edge of Murayama Park in Taiwan's capital in 1914. The following year, the menagerie, named Murayama Dōbutsuen (Yuanshan Dongwuyuan in Chinese, literally, Animal Garden at Circular Hill) was purchased by the colonial government and, in an effort to placate and assimilate the local Chinese population, renovated and expanded in time for the twentieth anniversary of Japanese rule. During the next 30 years the zoo went through a dozen (Japanese) directors, most of whom served in some additional official capacity within the municipal administration; none were zoologists, veterinarians or otherwise particularly qualified. The animal collection was a mix of regional and exotic fauna, supplied largely by animal dealers; throughout Japanese rule admission tickets financed only a third of the budget. With prices subsidized, attendance was 66,000 in 1921, the first year for which reliable statistics exist and 109,000 two years later; Taipei at the time had roughly 190,000 population. Murayama Zoo was, according to officially issued guidebooks, one of "Japan's five great zoos"—along with those of Tokyo, Osaka, Kyoto and Seoul.[111] (Korea was also a Japanese colony at the time.) With the outbreak of the Second World War, zoo keepers—those not drafted into the war effort—experimented with inferior foodstuffs to keep costs down, but after 1943 the collection was systematically culled either to reduce costs further or to obviate the outbreak of dangerous animals.[112]

Under Chinese rule, Yuanshan Zoo, as Taipei's zoo was now known, was reopened in February 1946 and expanded to six hectares (15 acres). To boost finances, the new management introduced animal acts, and attendance, only 100,000 in 1948, rose to 400,000 in 1952 and 700,000 three years later.[112] Star of the zoo became Linwang, a "war veteran" said to have been born in 1917 and captured by a Chinese unit in a Japanese forest camp in Burma in 1943. Brought to Taiwan in 1947 as a performing elephant, he was donated by the army to the zoo in 1953.[113] He lived there 50 years, passing away at 86 in 2003, a record (if true) for the species.[114] The Taipei zoo he died in was not, however, quite the same he had moved into. In 1974, municipal authorities decided to build a new, 165-hectare (408-acre) zoo in Muzha, a suburb southeast of central Taipei; the animals were removed to the new municipal zoo in 1986. Ten years later, the zoo, regularly attracting annually at least three million visitors even before, became connected to Taipei's rapid transit system. During a rare period of reconciliation, the government of the PRC donated giant pandas to Taiwan in 2008; the pair successfully raised offspring in the zoo for the first time in 2013.[112]

Taiwan's premier aquarium, the National Museum of Marine Biology and Aquarium (Guoli Haiyang Shengwu Bowuguan) on Checheng's Back Bay at the southern end of the island, was founded in 1991 and launched nine years later. Far from population centers, its location near Hengchun Airport was influenced by efforts to promote tourism in one of the poorest regions of the island. The aquarium *cum* museum covers 36 hectares (89 acres) and is surrounded on three sides by additional 60 hectares (148 acres) devoted to a commercial aquatic amusement park. The campus-like layout is dominated by three large pavilions devoted to the waters around and within Taiwan, coral reefs and oceans abroad, respectively. The congenial and attractive conflation of aquarium and museum has earned the institution an international reputation.[115,116]

12.6 TRENDS AND PROSPECTS

The origins of the Covid-19 pandemic that swiftly spread worldwide early in 2020 remain controversial, but it is certainly caused by the zoonotic virus SARS-CoV-2, presumably emerging from bats and transmitted through a host animal such as the pangolin to humans.[117] A wet market in Wuhan specializing in fish and live small wild mammals—the kind that centuries ago could serve as an *ersatz* zoo in Chinese towns and cities—appears to be the most likely way station if not actual culprit.[118] Two decades earlier, an outbreak of a SARS contagion originating in southern China could be tracked to Asian palm civets (*Paradoxurus hermaphroditus*) sold in wet markets in Guangdong province.[119] Yet exotic game meat remains popular in China,

despite exemplary conservation regulations on paper going back to the early 1980s.[120] Farming and trading in the exotic food market still generate annually a revenue of around US$20 billion.[83] Zoos and aquariums have contributed to the contradictory image that China portrays to the world. The country's oldest zoo restaurant, for example, Binfengtang in Beijing Zoo, only stopped serving exotic, zoo-produced game in 2010.[121] In Taiwan, this author has experienced aquarium restaurants that invite customers to pick out their fish themselves from the public galleries. Rare endemic animals, particularly the giant panda, have become expensive commodities with which to make good profits abroad.[122] But the management of zoos and aquariums in China can and does adapt to new concepts and innovation. For hundreds of millions of urban Chinese each year, zoos and aquariums remain the principal bridge to nature. A new generation of Chinese zoo biologists, if not always the bureaucrats, have become embedded in the international network promoting conservation and cooperation. For better or for worse, zoos remain one the best hopes for a vulnerable Chinese fauna.

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