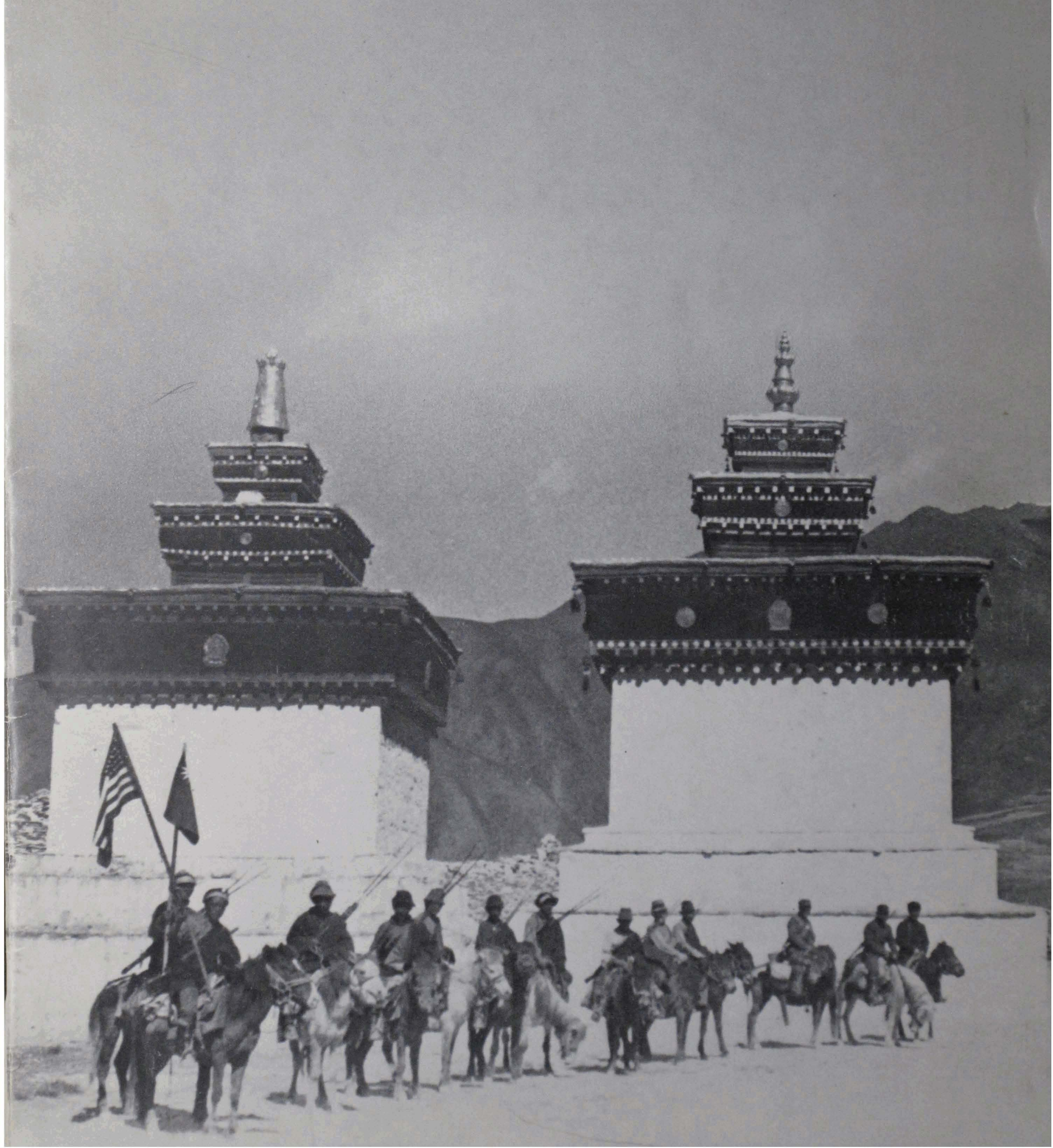
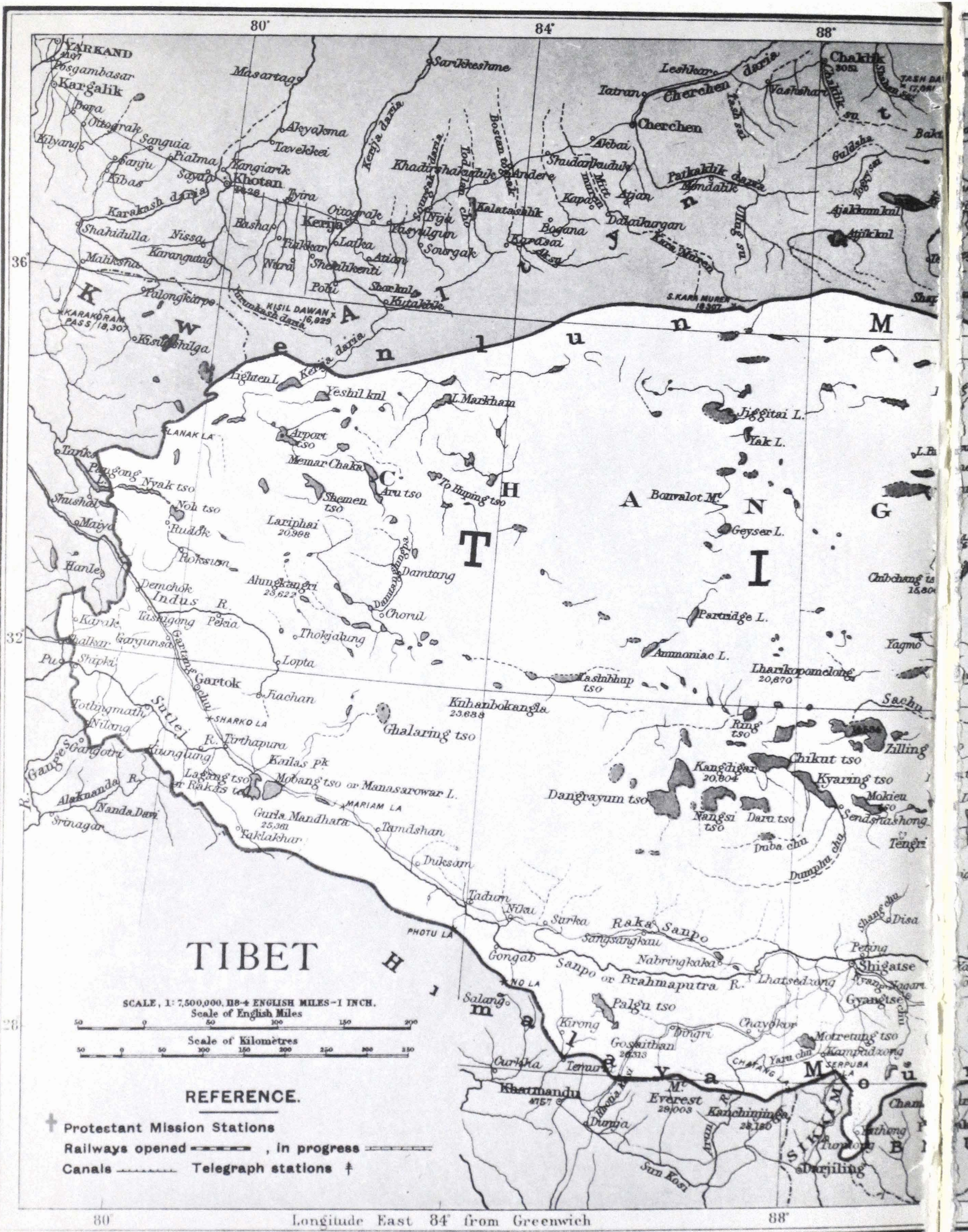


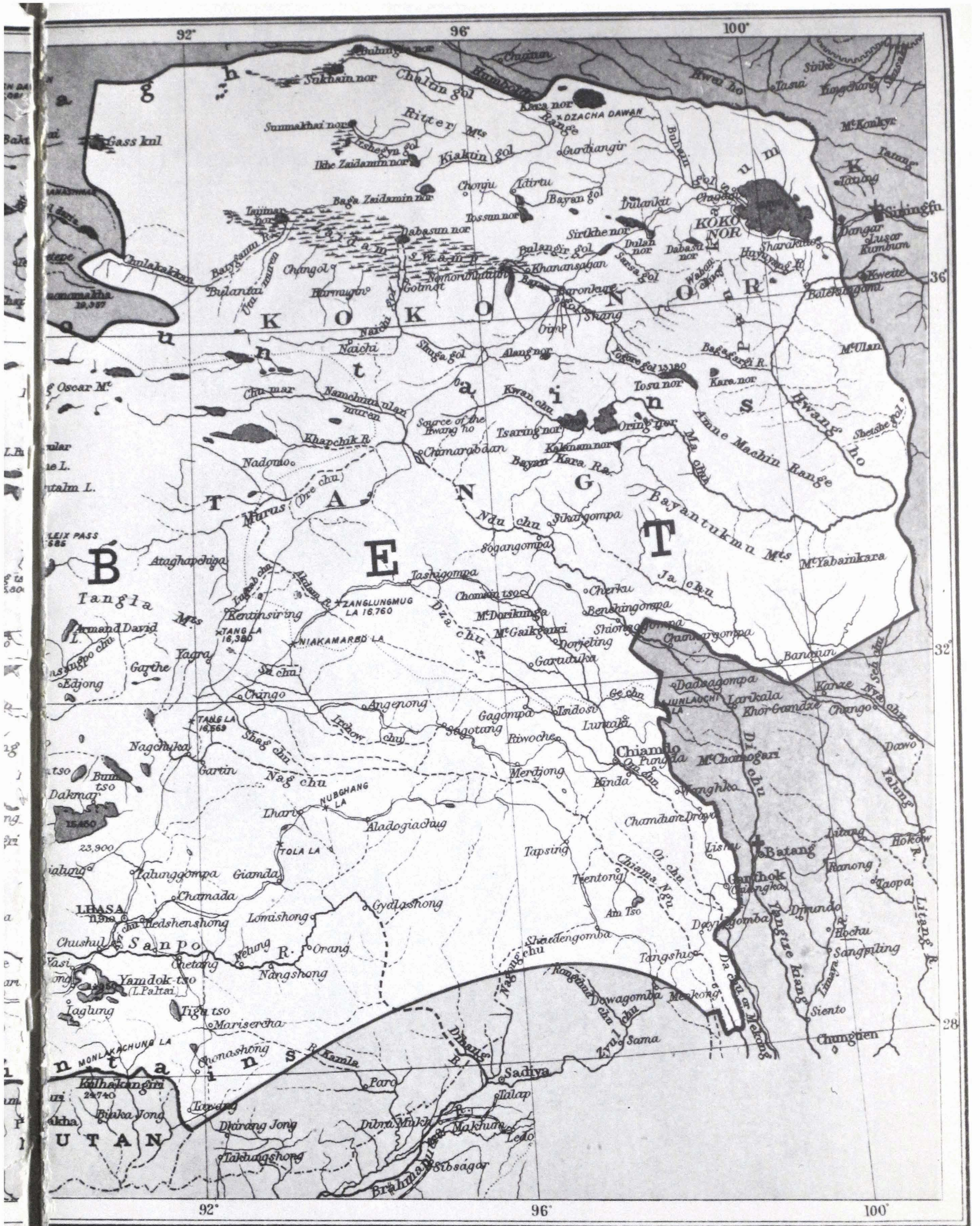
FRONTIERS

Annual of The Academy of Natural Sciences of Philadelphia

Volume II, 1980







Map of Tibet - from the Atlas of the Chinese Empire, The China Inland Mission, Morgan and Scott Ltd., London, 1908



076.

FRONTIERS

Annual of The Academy of Natural Sciences of Philadelphia

Volume II, 1980

TABLE OF CONTENTS

INTRODUCTION <i>by Thomas Peter Bennett</i>	iii
PART I. ACROSS TIBET; EXCERPTS FROM THE JOURNALS OF CAPTAIN BROOKE DOLAN, 1942-43	1
INTRODUCTION <i>by Thomas Dolan, IV</i>	2
JOURNAL EXCERPTS	4
PART II. THE FLORA AND FAUNA OF CHINA INCLUDING THE AUTONOMOUS REGION OF TIBET	47
THE HISTORY OF ORNITHOLOGY IN CHINA <i>by Rodolphe Meyer de Schauensee</i>	48
ASIAN DIORAMAS AT THE ACADEMY <i>by George B. Schaller</i>	64
CHINA'S CONTRIBUTIONS TO AMERICAN GARDENS <i>by Donald Wyman</i>	69
WILLIAM W. CADBURY, M.D., QUAKER MISSIONARY AND ORCHIDOLOGIST IN CHINA <i>by Howard Page Wood</i>	80
CONSERVATION IN CHINA: 1980 <i>by S. Dillon Ripley</i>	87
Appendix.	89

MANAGING EDITOR: *Robert McCracken Peck*
EDITOR: *Patricia Peterson Tyson*

FRONTIERS is published annually by The Academy of Natural Sciences
19th and the Parkway, Philadelphia, PA 19103

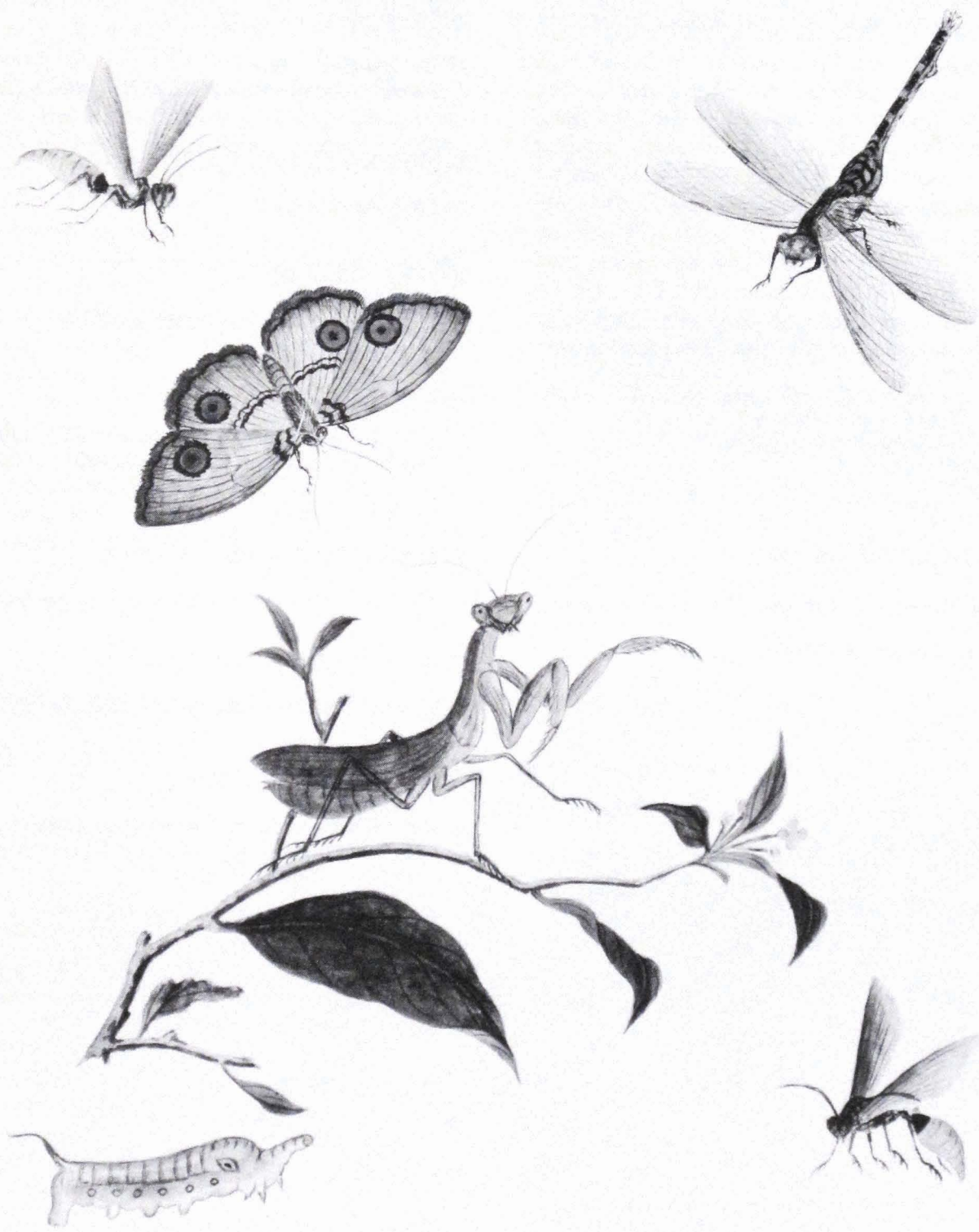
Thomas Peter Bennett, President
Minturn T. Wright, III, Chairman of the Board of Trustees

©copyright 1980 by The Academy of Natural Sciences of Philadelphia
Library of Congress Catalog Card Number: 80-640617
US ISSN 0016-2159

Cover: Before two splendid white chortens on the outskirts of Jyekundo, Tibetan headmen, carrying the flags of the United States and China, greet the members of the Dolan/Tolstoy expedition as they cross the Sino-Tibetan border.

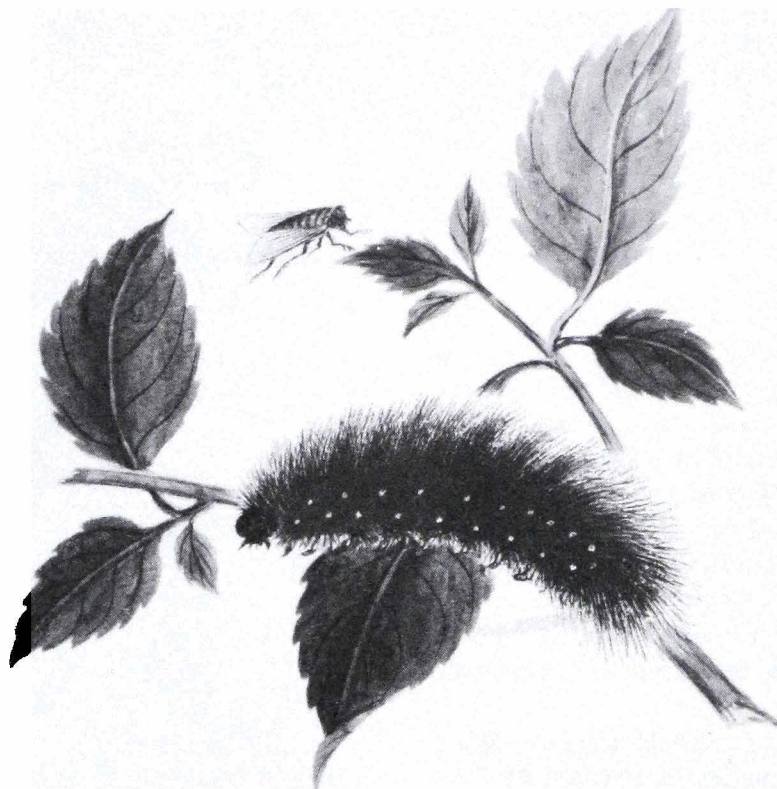
Left: A general view of the country in northwest Hubei. Peaks are 5,000 feet above the nullah. Hsing-shan Hsien, altitude 3,000 feet – June 14, 1910.

*Photograph by E.H. Wilson. Permission to use this photograph granted by the Arnold Arboretum.
© President and Fellows of Harvard College, 1980.*



Above and Right: From an album of 18th century Chinese watercolors in the Library of The Academy of Natural Sciences.

Part II
THE FLORA and FAUNA
OF CHINA
including the Autonomous
Region of Tibet



THE HISTORY OF ORNITHOLOGY IN CHINA

by
Rodolphe Meyer de Schauensee

THE EARLY PERIOD

The modern study of ornithology in China did not actually begin until after the Opium Wars of 1839-1842 and the subsequent opening of the treaty ports of Canton, Amoy, Foochow, Ningpo and Shanghai. However, interest in Chinese birds by the Chinese goes back for millenia, for birds have been a favorite subject of Chinese artists for centuries and the keeping of birds as pets or for decorative purposes has always been very popular.

The first representation of birds goes back to the Shang Dynasty (1523-1028 B.C.) and probably even before, when birds were commonly used as decorative motifs on bronze vessels and as free-standing finials on lids. The birds were very stylized, but the forms of owls and other birds were quite recognizable. During the succeeding Chou Dynasty, beginning in about 1028 B.C., finely executed birds of recognizable species such as Mandarin Ducks, appeared both in bronze or were modelled in pottery. It was not until the Han Dynasty (206 B.C. - 220 A.D.) that paintings of birds first appeared, the first known that on a banner from a tomb showing a crudely painted owl and a crow. Birds represented on bronzes, however, were much more realistic than those of the previous periods.

During the Tang Dynasty (618-906 A.D.) the fine modelled, glazed pottery horses and camels, familiar to almost everyone, were produced, and paintings containing birds began to achieve the skills shown in the succeeding Sung Dynasty which ended in 1260 A.D. During the latter period a very high degree of artistic skill was achieved and wonderfully shown by the superb rendering of a peacock (*Pavo muticus imperator*) in a painting entitled, "The Peacock King" (K'ung-chiao Ming-wang), which showed the plumage of a male bird in the minutest detail. It is now one of the treasures of the Ninnanji Temple of Kyoto, Japan.

Toward the end of the Sung period, Marco Polo made his journey to China (1271), which he reached by way of the Middle East, Russian Turkestan and southern Sinkiang, passing by Lop Nor on his way to Peking. Lop Nor was not to be seen again by a European until the Russian General, Nicolai Mikhailovich Przewalsky, reached it in 1876.

By the end of the Sung Dynasty, live, Far Eastern birds began to appear in Europe. A white cockatoo was owned by Frederick II as early as 1240; Mantegna painted one in 1496 in his "Madonna della Vittoria," now in the Louvre, and Prince Alessandro Farnese had a cockatoo as a pet in Rome in the middle 1500's.

It was not until 1498 that the sea route to the Orient was discovered by Vasco da Gama when he rounded the Cape of Good Hope and sailed into the Indian Ocean. With this great voyage of discovery during the Ming Dynasty (1368-1644), trade with China began to expand. The Portuguese established themselves in Macao in 1557, and from then on, Ming blue and white pottery, decorated with birds, frogs, insects, and flowers, began to reach Europe, as well as lacquerware and paintings on silk of birds, flowers and landscapes. Besides fanciful birds, such species as cranes, Blue-Winged Magpies, Tree Sparrows and pheasants were popular subjects.

Ritual Vessel, Chinese, Late Chou Dynasty



The Metropolitan Museum of Art, Rogers Fund, 1947



Tsun, Chinese, Late Chou Dynasty

Freer Gallery of Art, Smithsonian Institution

The art produced during the reign of Kang Hsi (1662-1722) and Chien Lung (1736-1795) was particularly admired in Europe and led to the very popular style known as *chinoiserie*. Sèvres and Meissen china with “Chinese” decoration was much appreciated and under Louis XV, Watteau, Boucher and Pillemont were leading exponents of *chinoiserie*. Decorative panels, andirons and interior decorations in the Chinese manner adorned the palaces of the nobility and royalty, and fine pieces of Chinese pottery were mounted in bronze *doré*.

By the early 1700’s and perhaps before, live Chinese birds began to make their appearance in Europe. Silver and Golden Pheasants reached Europe before 1735 and

Eleazar Albin made paintings of them, rather crude ones, for his *Natural History of Birds*, published in 1738. The Silver Pheasant (*Lophura nycthemera*) he called the “White China Pheasant” and of it he said, “. . . this Bird I saw at a *Lady’s* at *Enfield* where I made a drawing of it. I do not find this Bird described in any Author.” (sic) He much admired the Golden Pheasant (*Chrysolophus pictus*) which he called “The Red Pheasant Cock from China.” He saw it “. . . in the Possession of the Honorable *John Spencer* Esquire in his house at *Windsor Park*, where I went by his Order to draw it.” Again he says, “I do not find this beautiful bird described by any author.” A formal description of both was made by

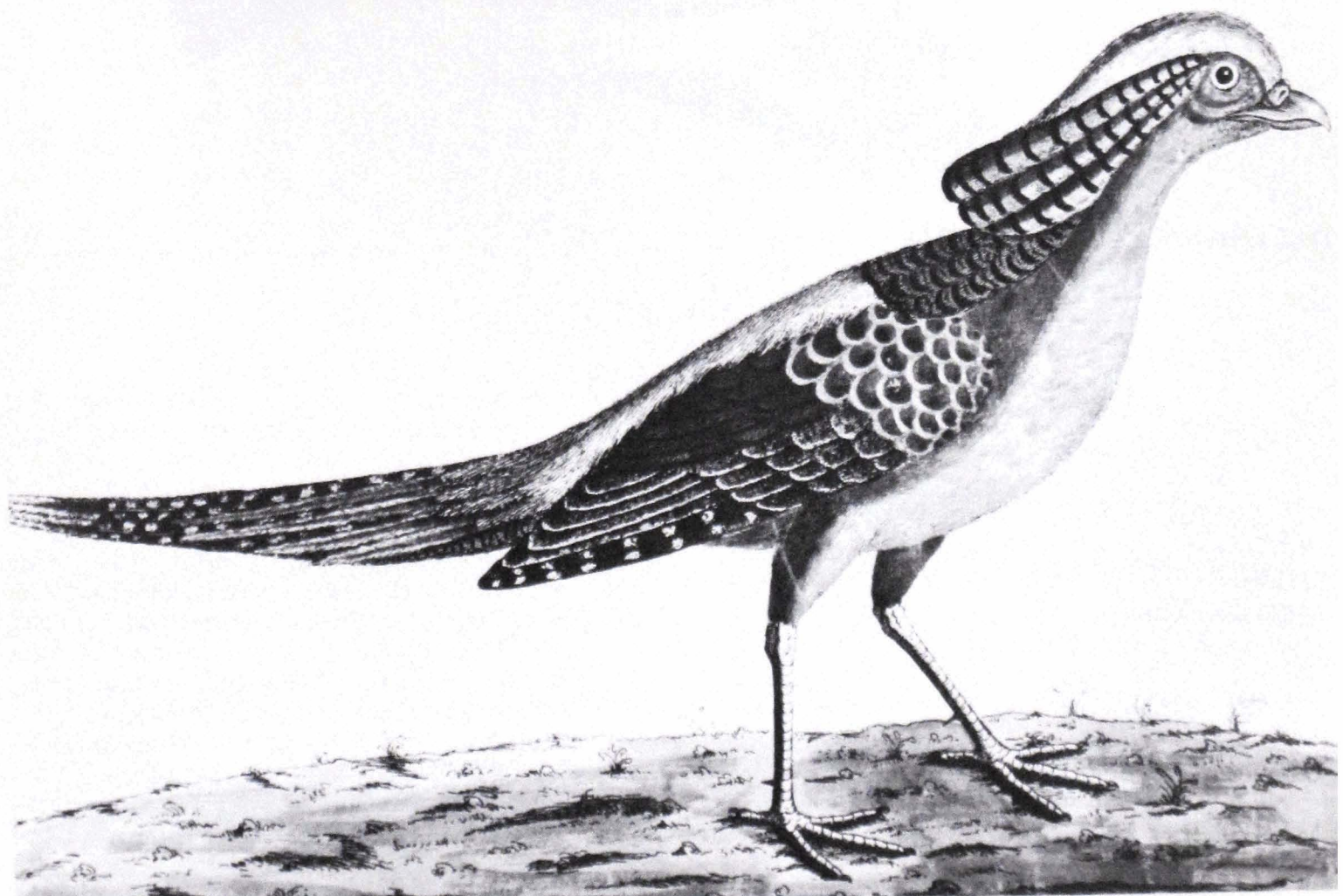
Linnaeus in 1758 in his *Systema Naturae*. That even small birds were arriving alive from China was a fact, for Albin depicted two specimens of what he called, "The Chinese Sparrow." Of them he said, "The portray of these birds I drew at Blands's. He told me they were brought from China in East India by the name of Chinese Sparrows. Their note is like the whistling of the wind." What he showed on his plate were actually two species, a Black-headed Mannikin (*Lonchura malacca*) and a Spotted Mannikin (*Lonchura punctulata*) which he took to be a male and female of the same species.

Shortly after Albin's book was published, Pierre Poivre, a Frenchman with a scientific interest in birds, arrived in Canton. This was in 1741 when he was 22 years old. While there he made a series of drawings of Chinese birds, but, unfortunately, these were destroyed when, on his return voyage to France, his vessel was captured by the British and he was taken prisoner. Be-

fore he was twenty he had decided to devote himself to the study of botany and natural history. After his return to France in 1748 he was instructed in the art of skinning and preserving birds. As a result, in 1750 when he returned to Canton, he was able to make a small collection of birds. Being of an adventurous nature he continued his journey reaching the Philippines and the Moluccas and returning to France via India and Madagascar. He collected birds in all the localities, reaching France again in 1757. Subsequently 60 valid names, 45 of them by Linnaeus, were given to birds he had collected.

Travel to China remained difficult during the 18th century. It was not until the Opium Wars of 1839-42 between China, England and France that travel became somewhat easier because of the opening of the Treaty Ports. English and French officials began to arrive at that time followed by missionaries and traders.

THE RED PHEASANT COCK FROM CHINA
from A Natural History of Birds by Eleazar Albin, London, 1738



The Academy of Natural Sciences

THE MIDDLE PERIOD

The names of three persons will forever stand out in the history of the ornithology of this period. They are those of Robert Swinhoe, Nicolai Mikhailovich Przewalski and Père Armand David.

Before the arrival of Robert Swinhoe, China was virtually *terra incognita* ornithologically to the western world. Swinhoe was born in Calcutta in 1836, but was sent to England for his education. Graduating from the University of London in 1853, he arrived in China in 1854 as interpreter for the British Consular Service. He soon became vice-consul and later consul at Amoy, Ningpo, Chefoo and Shanghai as well as in Taiwan. Devoting almost all of his spare time to studying and collecting birds, he worked mostly in eastern China, once ascending the Yangtze as far as western Szechwan. He was the first person to collect birds in Taiwan and Hainan where perforce everything he found was either the first record for the island or a new species.

Swinhoe's contribution to the knowledge of ornithology in China was of the greatest importance. He wrote the first check list of Chinese birds in 1863, recording 454 species and a revised list in 1871 which increased the number of birds known from China to 675 — both published in the *Proceedings of the Zoological Society of London*. He also wrote many letters on the subject of ornithology to *The Ibis*, the British ornithological journal. During the 19 years that he spent in China he described a great many birds which were hitherto unknown to the Europeans. In 1873 he was the consul at Chefoo, but his health failing, he returned to London taking with him his collection of birds which consisted of 3,700 specimens, belonging to 650 species. (Before his return he had sent many specimens to the British Museum.)

A small, but early collection of Chinese birds was made in Hong Kong in 1855 by Captain Rogers of the United States Exploring Expedition. This collection was reported on by John Cassin, curator of birds at the Academy of Natural Sciences of Philadelphia in its *Proceedings* of 1864.

While Swinhoe was exploring eastern China, the exploration of western China was to be undertaken by the courageous and indefatigable Père Armand David. David was a Basque and was born at Espalette in Basses Pyrenees. He became a missionary and went to China in 1862 where he was placed in charge of the French School in Peking. In 1864 he made an expedition to what remained of the great Mongolian forests north of Peking and in 1868 to regions west of Peking. In May of 1868 he started on his great expedition to Szechwan from which he returned in 1870 in such bad health that he was recalled to France. Returning to China in 1872, he made his fourth and last expedition, a journey to Shensi where he hoped to collect on the Tsinling Shan — a plan frustrated by a Mohammedan uprising. After his return to Peking he planned a trip to Fukien, but ill health



Robert Swinhoe
(1836-1877)

prevented it and he returned to France where he lived until 1900. His accomplishments were unparalleled. From his collections, 65 species of birds were described as new, as well as 63 mammals, including such spectacular novelties as the giant panda, the snub-nosed monkey and the Chinese takin.

David's work in China resulted in the publication in 1877, with E. M. Oustalet of the Paris Natural History Museum, of the monumental *Les Oiseaux de la Chine*, which included 124 colored plates of birds, most of them illustrated for the first time. This work formed the cornerstone of Chinese ornithology. It increased the number of species of birds known from China to 807, an increase of 123 species above Swinhoe's revised check list of 1871.

The study of ornithology in western China lagged somewhat behind the study of that science in eastern China, but this is not surprising for the western part of the country was much less accessible in the latter half of the 19th century than was the eastern part.

The first person to collect birds in western China was Dr. John Anderson, Superintendent of the Calcutta Museum. He acted as medical officer and naturalist to a British expedition to Yunnan.



Père Armand David
(1826-1900)

Starting from Calcutta at the end of 1867, the expedition reached Bhamo, Burma on February 26, 1868 with the object of crossing southern China to Canton. As soon as they entered Yunnan, they found themselves under constant attack, and reaching Tengyueh, they concluded that further progress eastward was impossible. They collected birds in the neighborhood of Tengyueh and the hills south of it, and then returned to Calcutta which they reached in November of the same year.

A second expedition was attempted in 1875 with the ambitious purpose of crossing China from Yunnan to Shanghai. Under the command of Colonel Horace Brown, this expedition was even less successful than the first, for after three days march into Yunnan they were attacked by a large Chinese force and had to beat a hasty retreat to Bhamo.

In spite of all the great difficulties encountered on two expeditions (1867 & 1875), Anderson collected 233 species of birds including a new partridge, the Mountain Bamboo Partridge (*Bambusicola fitchyii*).

By far the most important ornithological explorations in far northwestern China were those undertaken by the Russian ornithologists, Przewalski, Koslov and Roborovsky in the 1870's. Their names will always be remembered for the dangerous and arduous voyages they undertook in which ponies, camels and yaks were used for transportation, and for the many new species which they discovered.

The most illustrious of these explorer-naturalists was General Nicolai Mikhailovich Przewalski. In all he made four voyages and was the first European to see Lop Nor in southern Sinkiang since Marco Polo passed by the area in the year 1275.

In 1888, while Przewalski was preparing for his fifth expedition at Karakol, he contracted typhus fever from which he died at the age of 49. His name will go down as one of the great explorers and splendid naturalists. In his honor the name of Karakol was changed by Tsar Alexander III to Przewalsk. Many birds commemorate his name as well as that of the wild horse of central Asia, *Equus przewalskii*. In all he collected about 5,000 specimens of birds belonging to 430 species, many of which were new, including the Black-necked Crane (*Grus nigricollis*), the Chinese Hazel Grouse (*Tetraostes sewertzowi*) and Przewalski's Rock Partridge (*Alectoris magna*). As Przewalski was an excellent naturalist it was a great pity that he did not live to write an account of the birds he collected in the remote parts of China which he visited. In spite of his unfulfilled dream of reaching Lhasa he must have had the satisfaction of knowing that his contributions to the knowledge of the geography and fauna of western China were unparalleled.

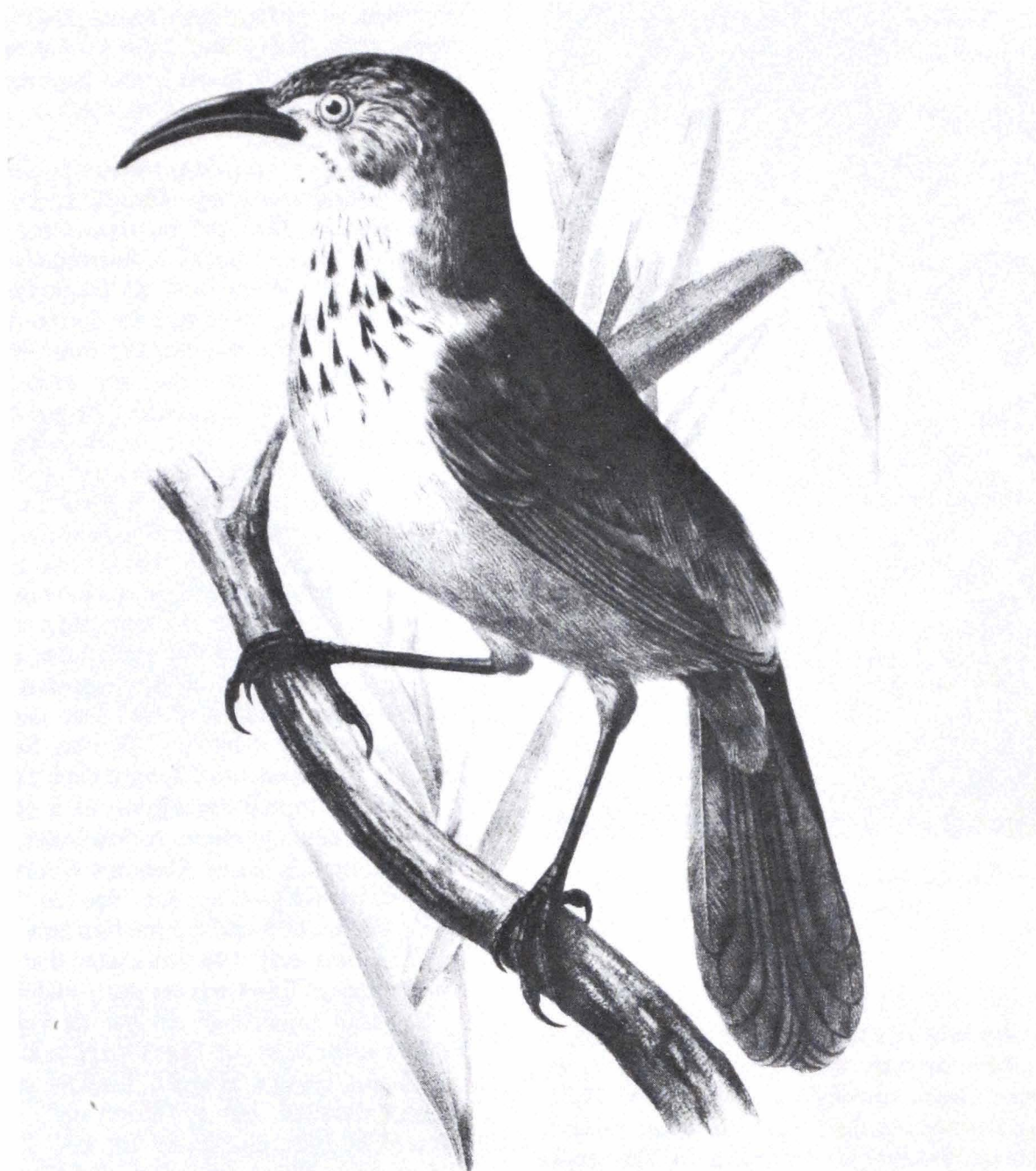
With the death of Przewalski, the leadership of his proposed fifth expedition fell to Colonel M. V. Pestvov, who started from Przewalsk in May 1889 accompanied by Koslov, Roborovsky and the geologist, K.I. Bogdanovich. The expedition lasted until January 1891. Koslov and Roborovsky made important collections of birds which included 234 species, many of which were collected on the little known Chang Tang plateau.

Koslov continued his explorations in western China where he made three more expeditions. These took place between 1893 and 1909. Ornithologically, Koslov's most important expedition was that of 1899-1901 which took him across the Burkhan Buddha where he had the pleasure of rediscovering Roborovsky's Rosefinch (*Kozlowia roborowskii*). He wrote "I was astonished to see . . . some very beautiful birds, *Leucosticte roborowskii*, discovered by the late Przewalski on his last trip to the Burkan Buddha mountains. M. Przewalski's expedition succeeded in securing only one specimen . . . and here, sixteen years later, I again saw them."

Passing between Oring Nor and Tsaring Nor, the expedition traveled due south, reaching Jyekundo in mid summer, then southward again, following the east bank of the Mekong to a point a few miles north of Chamdo where Koslov discovered two very interesting birds, Koslov's Babbler (*Babax koslowi*) and Koslov's Bunting (*Emberiza koslowi*); both still very rare in collections.

During the latter part of the great Przewalski-Koslov-Roborovsky era of exploration in western China, another expedition of importance was led by the botanist, G.N. Potanin.

During the years 1884-86 Potanin, together with the accomplished ornithologist and collector, M. Berezovsky, traveled through eastern Kansu and eastern Tsinghai. Berezovsky worked independently from Potanin and collected largely in eastern Kansu while Potanin marched southward to reach Sungpan in northeast Szechwan and ventured as far east as western Shensi. Potanin returned to Russia in 1885, but Berezovsky, with the financial support of W. P. Sukatscheff, remained in China for another year. Among the 267 species he collected were six interesting new ones, including a babbler which he named in honor of his benefactor, *Garrulax sukatschewi*;



The Academy of Natural Sciences

POMATORHINUS SWINHOEI
from Les Oiseaux de la Chine by E. M. Oustalet, 1877

a parrotbill which he named in honor of General Przewalski, and a titmouse for Père David.

A few years later, a remarkable expedition was conducted by Prince Henri d'Orleans, the son of Robert, Duc de Chartres. Accompanied by G. Bonvalot as naturalist and Père Dedekken, a Belgian missionary, and Abdulla, who had traveled with Przewalski, he left Djarkent (Panfilov) for Kuldja on September 1, 1889. He crossed the Tien Shan and reached the Korla oasis at its south slope where many difficulties were placed in his path to prevent further progress. He was able to leave there on October 10, crossed the Tarim Basin, crossed successively, the Kunlun, the Altin Tagh and the Chiman Tagh to Tengri Nor (Nam Tso). Hoping to reach Lhasa, he proceeded to the Dam Pass on the Tanglha Range,

the gateway to the holy city. Here further progress was barred by the appearance of 400 mounted Tibetans armed with lances, sabres and rifles, and endless negotiations began in the hope of being allowed to proceed. Lamas, chancellors and secretaries shuttled between the camp and Lhasa, only about 100 miles away, to no avail. After the negotiations, which dragged along from February 17 to April 15, Prince Henri gave up. Following the course of the Salween to a point north of Chamdo, he crossed the Yangtze, followed its east bank to Batang and then, turning eastward over the mountains, arrived at Tatsienlu. He then proceeded southward through Szechwan, Yunnan and Tonkin, finally arriving at Hanoi on September 26, 1890. The prize of the bird collection, which numbered 470 specimens, was a new species of



General Nicolai Mikhailovich Przewalski
(1839-1888)

babbler, *Garrulax henrici*, named in honor of the Prince.

While the Russians were making their great expeditions in western China, ornithologists in eastern China were not idle. Because of the work done there and in Taiwan by Robert Swinhoe and Père David, the cream had been skimmed off and new discoveries were hard to come by.

THE LATE PERIOD

In this later period, mention should be made of Frederick W. Styan, a resident of Shanghai. His work was mostly along the lower Yangtze and he wrote extensive notes on the birds of the region between 1893 and 1894. He also described two new interesting birds, the beautiful White-eared Hill Partridge (*Arborophila ardens*) from the mountains of Hainan and the Taiwan Bulbul (*Pycnonotus taivanus*). John D. de la Touche, a customs official in southern China, was one of the more important ornithologists of the 1900's. He, himself, collected but also employed Chinese collectors. His main contribution to the ornithology of China was the publication between 1925 and 1934 of *A Handbook of the Birds of Eastern China*, which described all the birds known from Heilungkiang to Kwangtung. In addition to his book he published many papers on birds, beginning in 1887.

Another book on the birds of eastern China was published in 1931, *South China Birds*, written by the missionaries, Harry and John C. Caldwell. This book described the birds found from Chekiang to Kwangtung, and gave interesting notes on habits as well as Chinese legends about them.

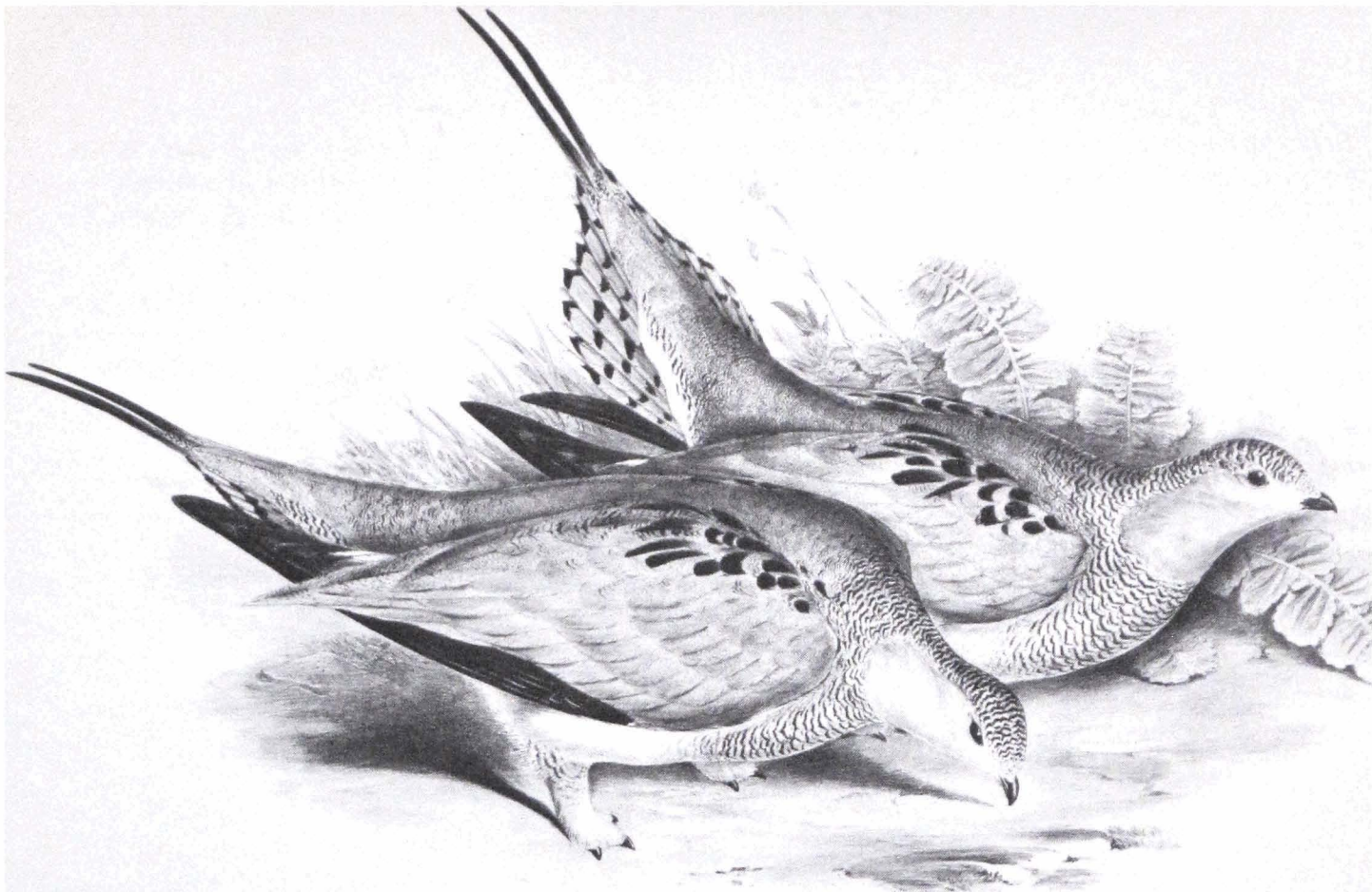
Tibet was by no means neglected, although scientific ornithological collecting did not begin until the early 20th century. The first mention from remote and inaccessible Tibet came at a surprisingly early date. In 1812, William Moorecroft, an employee of the Indian Civil Service, journeyed to Lake Manasarowar in western Tibet to ascertain whether the rumored source of the Ganges was actually there. He wrote a colorful and sometimes amusing account of his journey in *Asiastick Researches* in 1816. In it he mentions seeing "some Brahminy Geese (Shelducks?) and small shrikes (Sand Martins?) hovering over the river", and at the end of a long march, he "saw no birds except the red Tuti (*Carpodacus*), larks and linnets, but at our camp there were ravens of a very large size, with a loud *caw*, an immensely large eagle (Lammergeir?) on the wing and a blue pigeon (Stock Dove?) with lighter blue plumage than that common in Hindustan." He also reported seeing a fawn-colored grouse with feathered feet and two long tail feathers, undoubtedly the Tibetan Sand-Grouse, not formally described until John Gould named it in 1850.

The first formal description of a bird coming from Tibet, but actually native to Szechwan, was the naming of the Common Eared Pheasant (*Crossoptilon c. crossoptilon*) by Hodgson in 1838. The bird had been brought to Katmandu in Nepal by the Nepalese envoy to Peking.

It was not until 100 years later that the study of the ornithology of Tibet was seriously undertaken.

Of great importance to the knowledge of Tibetan birds was the work of Frank Ludlow and, later, Ludlow and Major George Sherriff. Ludlow in 1923 collected around Gyantze, but collecting on a large scale commenced in 1936 and lasted till 1947. In 1942 Ludlow was sent to Lhasa in charge of a British mission, but this hardly interrupted his ornithological activities. Ludlow and Sherriff ranged all over southeastern Tibet collecting both north and south of the Tsangpo-Brahmaputra and east as far as the gorges of the river where it turns to the south. Very large collections of Tibetan birds were amassed, all of which went to the British Museum of Natural History and were reported on by Ludlow and N. B. Kinnear of that Institution. Ludlow contributed the field notes which are of great value.

Brooke Dolan led two expeditions to western China for the Academy of Natural Sciences, one in 1931-32 and the second in 1934-36. On the first expedition, the main area of collecting was in the Sungpan area, and while the chief object of the expedition was to secure specimens of the giant panda and the takin, a collection of 975 specimens of birds was made. The second expedition was much more important ornithologically. Accompanied by the naturalist, Ernst Schäfer, of the Berlin Museum, the expedition traveled from Chengtu to Batang, then north to Jyekundo and to the headwaters of the Yangtze along the lower slopes of the Marco Polo Range. The first specimens of the Tibetan Rosefinch (*Kozlowia roborowskii*) and Koslov's Bunting



TIBETAN SHORT-TOED SAND GROUSE
from Birds of Asia by John Gould, London, 1850-83
(Vol. VI, Plate 61)

The Academy of Natural Sciences

(*Emberiza koslowi*) since those secured by Koslov, were collected, and an interesting new subspecies of the Common Eared Pheasant (*Crossoptilon crossoptilon dolani*) was discovered. It differed from all other varieties by the rough texture of the feathers of the lower back which are somewhat curled, a feature not found in any other eared pheasant.

Schäfer's contribution to the knowledge of ornithology of western Szechwan and Tsinghai was his splendid account of the habits and distribution of the birds published in the *Journal für Ornithologie* in 1938.

In 1926-27 N. Gist Gee, L. I. Moffet and G. D. Wilder published the first check list of Chinese birds since that of Swinhoe. This list was described as tentative and was followed by a revised list by Gee in 1930-31, which recorded 1051 species as occurring in China. Following this, Dr. Tso Hsin Cheng compiled and published in 1947, a list which has been most useful world-wide, for, although written in Chinese, the Latin and English names of the birds are given and many distributional maps show the Chinese range of birds. In 1977 this list was brought up-to-date in the publication by the same author of, "A Distributional List of Chinese Birds," in the same journal as the earlier work. It included 1166 species.

Works by other Chinese ornithologists of lasting value were the many papers on Chinese birds by Tseng Hwang Shaw which culminated in, *The Birds of Hopei Province*, a two-volume work with many line drawings published in 1936. K. Y. Yen wrote extensively on

birds from southeastern China in the 1930's. A very prolific writer on the birds of Hong Kong and a resident of that city was the Dane, G. A. C. Herklots, active from 1932 to 1953.

One cannot conclude this account without mentioning the highly important work of the late Charles Vaurie. Although he did not write strictly on Chinese ornithology, his many publications have a very significant bearing on it. He wrote innumerable papers on birds of the Palaearctic region which culminated in the publication of *The Birds of the Palaearctic Fauna*, in two volumes, passeriformes in 1959 and nonpasseriformes in 1965. This was followed by *Tibet and its Birds* in 1972. Tibet in this instance did not mean the Tibet Autonomous Region. He included the south slope of the Himalayas, Ladak, Baltistan and Spiti, north to Sinkiang and Tsinghai. In addition to listing all the birds from the region, the early part of the book contains an interesting history of ornithology of the area and an invaluable list of localities where birds have been collected, with their exact geographical position.

Rodolphe Meyer de Schauensee, Curator Emeritus of Ornithology at The Academy of Natural Sciences, is the author of A Guide to the Birds of South America, The Birds of Columbia, A Guide to the Birds of Venezuela and numerous other books and papers on birds of the world. He is now at work on a comprehensive guide to the birds of China.

PAINTINGS
OF CHINESE BIRDS
circa 1730 (?)

The eight colored plates that follow were selected from among one hundred and forty-eight anonymous Chinese temporary paintings collected in China by Manuel Eyre (1837-1912) and bound in two volumes. The first volume contains seventy-seven botanical paintings, while the second, from which these plates have been reproduced, contains seventy-one paintings of mammals, insects and birds.

The volumes were presented to the Academy of Natural Sciences by Mrs. Roland R. Foulke (Ellen Griffith Foulke) in 1933, in memory of Robert Eglesfeld Griffith. They had been in the possession of the family for years, from the estate of Mrs. Foulke's grandfather, Manuel Eyre, a shipbuilder, who probably acquired them in his business ventures. The paintings are believed to be over 200 years old. In 1945, Hui Lin Li, an authority on Chinese art of the period, said that the bindings corroborate the statement of age.



The Academy of Natural Sciences

SILVER PHEASANT
Lophura nycthemera



GOLDEN PHEASANT
Chrysolophus pictus

The Academy of Natural Sciences



The Academy of Natural Sciences

EMERALD DOVE
Chalcophaps indica



The Academy of Natural Sciences

TREE SPARROW
Passer montanus



The Academy of Natural Sciences

SPOTTED DOVE
Streptopelia chinensis

BLACK-HEADED MANNIKIN
Lonchura malacca

The Academy of Natural Sciences





The Academy of Natural Sciences

BLACK-CAPPED KINGFISHER
Halcyon pileata



The Academy of Natural Sciences

LAUGHING THRUSH
Garrulax galbanus



Yak Diorama

ASIAN DIORAMAS AT THE ACADEMY

by

George B. Schaller

Over 40 years have passed since the two Dolan expeditions traveled in China. The results of these expeditions are usually viewed in terms of the number of specimens collected and dioramas subsequently prepared at the Museum. However, the expedition notes on distribution, behavior, and habitat preferences of various species were also an important contribution. The scientific publications by Ernst Schäfer¹ and by C. Engelmann, who analyzed some of Schäfer's results, still represent the most recent published information on the habits of such species as kiang, wild yak, and takin; new data on blue sheep were collected only recently. Today's biologists interested in high-altitude mammals of China must still draw on the results of the Dolan expeditions, attesting to their lasting contribution to natural history.

1. Ernst Schäfer, a noted zoologist from Goettingen University in Berlin, accompanied Dolan on his expedition of 1934-36.

YAK (*Bos grunniens*)

The bleak uplands of Tibet, at altitudes of 4000 m and above, are the home of the yak. The scientific name of this species of wild cattle, *Bos grunniens* means the "grunting ox," so named for the animal's habit of grunting softly on meeting others and harshly when threatening each other. The domesticated form of yak is a familiar sight at high altitudes in the Himalaya, where residents prize it as a beast of burden and for its wool, meat, and milk, but the wild form has been so little encountered by Westerners that its habits remain virtually unknown.

Wild yak may congregate in herds numbering 300 and even 2000; one explorer wrote that "on one green hill we could see hundreds upon hundreds of yak grazing; there was I believe more yak visible than hill." As recently as 1976, Chinese scientists saw herds with up to 100 animals in northern Tibet, a welcome indication that the species survives in the wild. Adult males tend to be alone or in bull herds, except in September and October when they join the cows during the rut.



Kiang Diorama

The bulls are huge, one shot by Ernst Schäfer weighed 821 kg, as compared to 306 kg for a cow. With curving horns and a bulky black body, with a conspicuous hump and long, shaggy fringes of hair on neck, shoulders and sides, the males are extremely impressive. And indeed, these features are used to intimidate rivals for cows in heat. Opponents stand broadside, displaying their power and physical attributes, until one turns aside, accepting a subordinate position. During tense encounters, yak also grind their teeth threateningly. When harassed by wolves—their principal predator except man — herd members “all rush together and remain thus with their heads toward the threatened danger,” to quote one traveler, behavior reminiscent of that described for muskox in similar situations.

KIANG or Tibetan wild ass (*Equus hemionus kiang*)

High on the Tibetan plateau, on the vast expanse of barren soil at altitudes of 4000-5000 m where freezing winds sweep over the treeless hills, the kiang makes its home in company with yak, argali sheep, and Tibetan antelope. “It seems to delight in the coarsest and most wiry pasturage” in the vicinity of lakes and rivers, wrote one explorer. However, forage is nutritious only during the brief summer, and kiang must within weeks store enough fat to help carry them through the bitter winter.

At the same time, in August and September, the animals rut. Kiang are usually found in small groups of 4 to 5 but they may on occasion form herds of 300 or 400. Ernst Schäfer once encountered 1000 kiang in a day’s walk. Stallions are often alone but before the mating season they approach the female herds; and as the foaling time approaches in late July and August the mares congregate at favorite localities, while the stallions go off by themselves again. Are kiang stallions territorial in the manner of African wild asses? No one knows, for the kiang’s life still remains unwritten.

But at least the animal persists in moderate numbers in northern Tibet, according to Chinese scientists, and since China is now permitting field studies of Western scientists, there may soon be an opportunity to observe kiang.



Giant Panda Diorama

GIANT PANDA (*Ailuropoda melanoleuca*)

In 1869 Père Armand David, while in the Sichuan province of China, obtained the specimens of what he considered to be a new species of bear. The following year the anatomist Milne-Edwards, after examining the material, wrote: "In its external form, indeed, it very much resembles a Bear, but the osteological characters and dental system clearly distinguish it from the Bears and come nearer to the Pandas and Raccoons." Today the consensus has swung in the favor of bears again, but whatever its taxonomic status, the giant panda, with its striking coloration and cuddly appearance, has enchanted the public, becoming perhaps the most popular of all animals. At the same time it has remained mysterious. Rarely seen in zoos (outside of China only the zoos in Washington, Mexico City, Tokyo, Madrid, London, Paris, and Pyongyang have a panda or two), and wholly confined to rugged mountains in about 30,000 km of Sichuan, Shaanxi, and Gansu provinces of China, little more of the panda's habits in the wild have been revealed than those reported by Père David over 100 years ago. During the 1970's, several Chinese scientists studied pandas, but most of their data remain unpublished.

It is known that pandas are essentially solitary. During the mating season in March and April, adults climb to the tops of trees and call, no doubt one way in which they locate each other in the rugged terrain. Pandas favor the moist bamboo zone in altitudes of from 1800-3500 m. The shoots, leaves, and stems of bamboo are the pandas' principal food, occasionally supplemented in summer with other plant species. The panda's forepaw is prehensile, a special protruding wristbone having

developed which enables the animal to pick up and hold objects such as bamboo stems with great dexterity.

Bamboo stems are not very nutritious, and the panda must eat prodigious amounts to sustain itself. Its trail is littered with droppings, each spindle-shaped and about 10-15 cm long and 5-7 cm thick. When I recently visited panda habitat in Sichuan, I found one site where a panda had apparently rested for a few hours; there were 44 droppings, all consisting of chewed bits of bamboo stem.

The lack of knowledge about pandas in the wild is not surprising. The first Westerners went into panda country mainly to collect animals for museums and zoos, not to observe behavior. Theodore and Kermit Roosevelt shot the first panda in 1929. Next on the scene was the Dolan expedition. On May 31, 1931, Ernst Schäfer of that expedition shot an infant and three adult specimens were purchased from the local inhabitants. Three of these animals are now in the Academy's diorama. The first live panda did not leave China until 1936. By the end of that decade, natural history exploration ceased because of the war, and it did not resume until 1980 when the People's Republic of China permitted representatives of World Wildlife Fund International to visit panda habitat.

However, observations on captive pandas, principally at the Peking zoo, have added details concerning the animal's life history. Females have an annual spring period of heat. Age at sexual maturity appears to be at 5 to 6 years, although one female at the National Zoo in Washington came into estrus at the early age of 2½ years. In 1963, Lin-Lin at the Peking zoo gave birth to the first panda born in captivity and a year later she gave birth once more. A newborn is tiny, weighing at



Takin Diorama

most 150 gms, but it grows rapidly, reaching 9 kg at 5 months and 36 kg at 12 months. Adults generally weigh between 90 to 135 kg.

The panda is an endangered species, the Chinese estimating that only about 1000 remain in existence in the wild. Ten reserves have been established to protect the animal, but it still is thought to have declined recently because of a peculiar circumstance: bamboo flowers only at long intervals and then dies, the interval depending on the species. In 1976 much of the bamboo in the northern part of the pandas' habitat flowered for the first time in nearly 100 years, and many animals, deprived of their main food, appear to have starved. The bamboo in other areas may bloom during the 1980's. How can the pandas be saved? To check on the status of pandas, study their life history, and develop emergency rescue methods, the World Wildlife Fund and China have just started a collaborative research program.

TAKIN (*Budorcas taxicolor*)

Huge, shaggy, and plump, with stout legs and a bulging, convex muzzle, the takin looks ponderous, cow-like. But even though takin look ungainly and may weigh 250 kg and more, they are agile creatures, inhabiting mountainous terrain up to an altitude of 4500 m, a habitat very different from that of their nearest relative, the muskox of the Arctic plains.

The distribution of takin is patchy, most populations being found in China, mainly in the Sichuan and Yunnan provinces, but some also in northern Burma and along the Himalaya as far west as Bhutan. Within this range, three subspecies of *Budorcas taxicolor* are recognized,

among them the spectacular golden takin *B.t. bedfordi* which has a creamy golden pelage rather than the gray and brown of the other subspecies. In the western part of their range, takin inhabit dense evergreen forests and in the eastern they are often found in thickets of bamboo, willow, and rhododendron, growing between jagged cliffs; during the summer they may climb up out of the forest to forage on alpine meadows.

Little is known about the social structure of takin except that herd size rarely exceeds 50 but that as many as 300 animals may concentrate at a favorable feeding site. Old bulls are said to live alone or in small bull herds. During the rut from July to September the bulls emit low bellows. A single young is born in spring after a gestation period of 200-220 days.

George B. Schaller, Director of Conservation for the New York Zoological Society, has been actively involved with field studies of wildlife since 1952. His many books about his research include: The Year of the Gorilla, The Serengeti Lion (A National Book Award winner) and Mountain Monarchs. Over the past six years, Dr. Schaller has explored areas in and around the Himalaya (one journey was the subject of Peter Matthiessen's The Snow Leopard). These expeditions are described in his most recent book, Stones of Silence. In addition to his work on jaguars in Brazil, Dr. Schaller is currently heading "Project Panda," a cooperative conservation-research program between the World Wildlife Fund and the Peoples Republic of China.



CHINA'S CONTRIBUTION TO AMERICAN GARDENS

by

Donald Wyman

China has truly been called the "mother of gardens."¹ Over a million square miles larger than the United States, it extends from the tropics to the frigid cold of Siberia. After years of study and exploration, it has proved to contain more indigenous species of woody plants than any other temperate region of the world, and more tree species than all the other temperate regions of the world put together. There is no garden in the temperate areas of the United States that does not have prominent specimens native somewhere in China. No one man has introduced more Chinese plants to America than Ernest Henry Wilson (1876-1930), but before some of his outstanding contributions are enumerated let us mention how some of these Chinese plants first came to America.

Exotic plants introduced into America might be considered as coming during three general periods. Prior to the mid 17th century, the earliest European settlers brought fruit trees and useful so-called economic plants, for they had to survive in a new land with unknown food resources, so naturally they brought with them plants with which they were familiar. These plants were mostly of European origin. Not all however, for even before this earliest period, some plants native to China like peaches, mulberries and apricots had already reached Europe, coming across the overland trade routes from China through Tibet and Afghanistan.

The second period (mid 17th to mid 18th century) was characterized by a busy transfer of plants from Europe to America and vice versa. Americans were becoming well established, had more time for leisure and avidly sought all the plants they could from European gardens. During this period too, more Chinese plants came from these same European gardens – the Tree of Heaven (*Ailanthus altissima*) from France in 1750, the

1. Ernest Henry Wilson, China, Mother of Gardens, Stratford Co. Boston, 1929.

Left: View from Peh-yang-chang looking in the direction of Sungpan – northwest Sichuan – showing treeless nature of country. Mountain peaks 3-5,000 feet above river. Lun gan Fu, altitude 4,350 feet – August 16, 1910.

Photograph by E. H. Wilson.
Permission to use this photograph granted by the Arnold Arboretum.
© President and Fellows of Harvard College, 1980.

0255.

Ginkgo in 1784, the Chinese Apple (*Malus spectabilis*), *Rosa multiflora*, *Hydrangea macrophylla*, and *Sophora japonica* which, regardless of the name, was of Chinese origin, and *Wisteria sinensis* are a few examples.

The third period, from the mid 19th century on, was marked by a specific interest in Chinese plants, many of them coming directly to America from China. Missionaries and diplomats as well, had been sending seeds and cuttings back to Europe and America. Robert Fortune collected for the Royal Horticultural Society of England from 1840 to 1860 and sent back, among other things, *Prunus triloba*, *Spiraea prunifolia*, *Viburnum tomentosum* and several Forsythias, all of which now are commonly grown in our gardens. Charles Maries, collecting in China for the great nursery firm of the Messers Veitch in 1879, sent back many things collected from gardens in communities along the Yangtze River from Shanghai to Yichang. He had difficulties with the natives and finally reported that most of the Chinese plants had already been found and sent to England.

Dr. E. Bretschneider, a physician at the Russian embassy in Beijing (Peking), sent seeds directly to the newly established Arnold Arboretum in Boston, Massachusetts (one of the most important of which was the Late Lilac, *Syringa villosa*). Father Armand David, a French Catholic priest, collected several important plants in northern China from 1870 to 1880. It should be noted that all these men, and others, collected plants chiefly from Chinese gardens; few explored virgin territory in the hinterland. The oversight was undoubtedly because of the extreme difficulty in travel during those days

and the hostility of the natives towards foreigners in the less populated areas of the back country.

Another plant collector, Dr. Augustine Henry (1857-1930) was commissioned by James Veitch and Sons to collect in China near the end of the century. Wilson later said of him "— no one in any age, has contributed more to our knowledge of Chinese plants than this scholarly Irishman." It was Henry who came back and reported glowingly of the Dove Tree, seeds of which he could not obtain. This moved James Veitch to commission Ernest Henry Wilson to find the tree in China and send back seeds. It was this that started Wilson on a lifetime of plant collecting, during which time he made four trips to China which took eleven years. His trips took him mostly to western Hubei (Hupeh) and Sichuan (Szechwan) provinces.

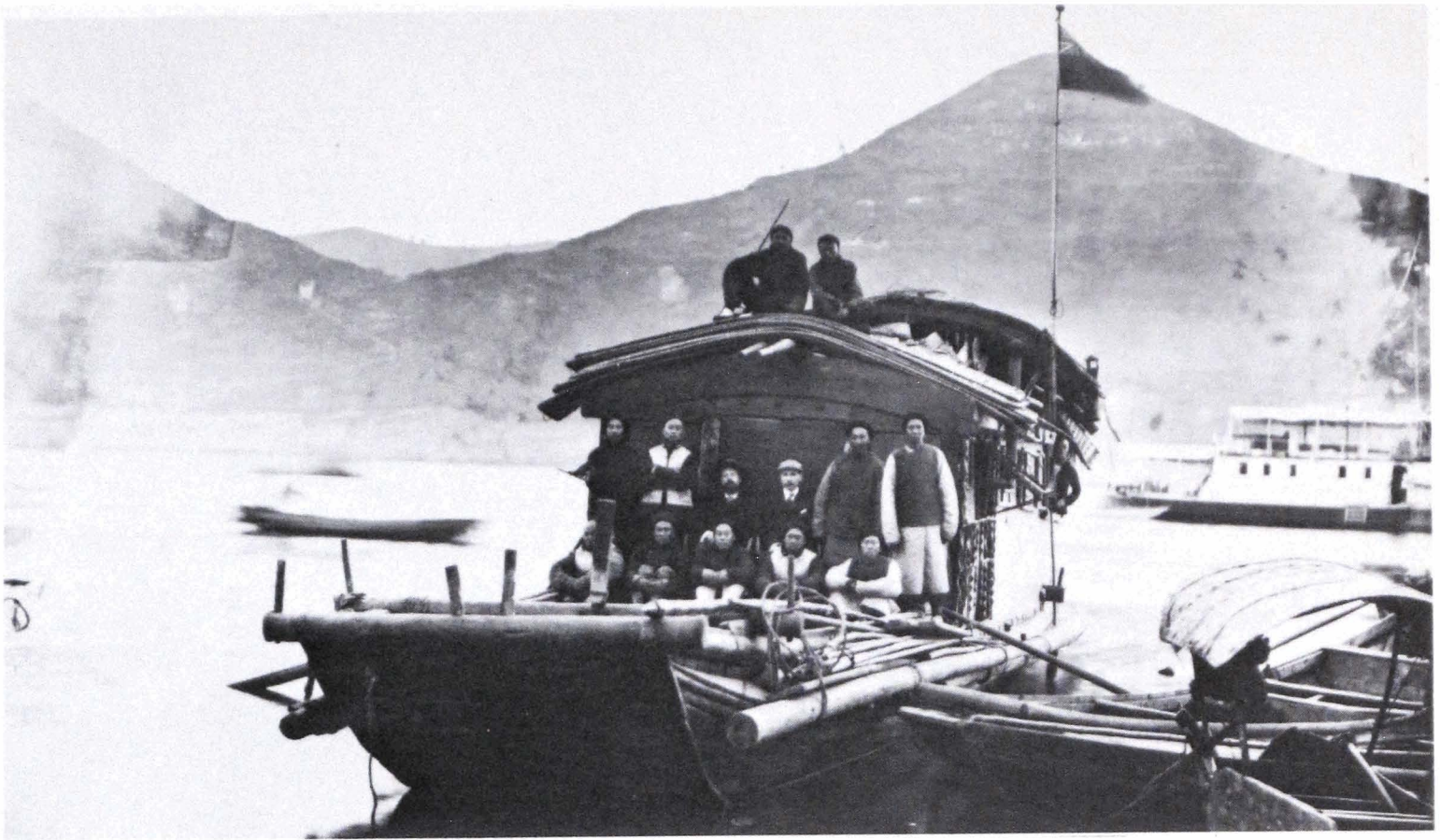
Wilson was born in Gloucestershire, England, Feb. 15, 1876. He studied at Kew Gardens in England when James Veitch, at that time the director of the great Veitch Nurseries, was looking for someone to go to China and bring back seeds of the Dove Tree. Commissioned by Veitch in 1899 to do this, Wilson first studied all the reports he could find of others who had looked for plants in China. It was known, of course, that China was a vast country where every bit of available land was used to grow crops to support its huge population, regardless of whether that land was on level plain or steep hill.

On this, his first trip, Wilson made it a point to see Dr. Henry in China and obtain directions as to where he might find the Dove Tree. When he eventually found

The hostel of Hsao-lung t'ang with bee hives at right – western Hubei. Fang Hsien, altitude 7,000 feet – June 16, 1910.

Photograph by E. H. Wilson
Permission to use this photograph granted by the Arnold Arboretum,
President and Fellows of Harvard College. 1976.





*Photograph by E. H. Wilson
Permission to use this photograph granted by the Arnold Arboretum
© President and Fellows of Harvard College. 1976*

One of the house boats of the Wilson Expedition up the Yangtze River. E. H. Wilson is third from the left in the back row.

the place, the natives had cut down the tree to supply lumber for a house built on the spot. After persistent efforts, he eventually found other trees from which he collected seeds that were sent back to England where they germinated. He made a second trip for English sponsors (1903) and two more, later, for the Arnold Arboretum of Harvard University (1907 and 1910). All in all, he collected 65,000 botanical specimens and sent back to England and America 1500 plants in the form of seeds, cuttings, bulbs or plants, many of them unknown to science.

He first collected along the main traveled roads and rivers. It was these areas that had been searched before by others, so much so that it led to the general impression that most of the plants China had to offer had been found and already introduced. It did not take Wilson long to realize that there was still a tremendous unexplored area, far removed from the inhabited haunts of commercial travelers, that later he found to be a gold mine of plants unknown to science.

Although at first unable to speak any language but English, Wilson was fortunate in the loyal guides he selected. He never had serious trouble with the natives, and though, on occasion he did have some rough times, he was always able to manage things amicably, (quite an asset considering the often barbarous country through which he was traveling). One time he had to hire known head hunters as his porters, spending some uneasy nights mulling over the possibility of what might happen if

these men proved obstreperous.

At the time, the Yangtze River was navigable by steamer for about 1000 miles from its mouth as far as Yichang (Ichang). Western Hubei (Hupeh) and Sichuan (Szechwan) Provinces were his chief hunting grounds, for here the temperature and rainfall were similar to those of America and Europe. During his two earlier trips most of the seeds and plants were sent back to England, and those of the later two trips were sent back to the Arnold Arboretum. It was naturally this area that he had in mind when he considered plant hardiness.

Roads at that time were practically non-existent when off the beaten track between major cities. In fact, when Wilson traveled overland away from the rivers, he found only single tracks where mules and donkeys could walk. In many areas there was not even room for carts so that he was forced to hire coolies, sometimes 20-30 of them, to carry all equipment and provisions on their backs. To add to his troubles, the maps of the times were often inaccurate or non-existent, so that directions for the next day's travel, if they could be obtained at all, had to come from the natives present at the time.

Wilson found it essential to have his own sedan chair and also one for his chief assistant. This lent prestige to the entire expedition, and he sometimes thought it was more important than his passport in obtaining assistance from the local officials. Many times he did not ride in it, but on occasion he did, if only to keep curious natives



(many of whom had never seen a foreigner) from bothering him. There were times when he had to wash, eat and sleep with a group of curious Chinese gathered around him staring.

The sedan chair was almost Wilson's undoing during his last trip to China. He had traveled 1800 miles up the Yangtze River, and another 250 miles up the Min River in order to reach an area where he knew the Regal Lily (*Lilium regale*) grew. He had seen this lily on a previous trip, but had failed to send bulbs back to America. This time he found it high up in the valleys of the Tibetan-China border, and had made arrangements to have several thousand of them dug and sent to America. On his way back to Chengdu (Chengtou Fu) his group passed a mule caravan that was just getting ready to start in the morning. Wilson, riding in his chair, saw his two lead coolies stop, look up the mountain and then start to run. He heard a falling rock and got out of his chair in the nick of time to see a bounding boulder demolish it and knock the remains down into the deep ravine below.

In trying to save himself he was hit by another boulder in this small avalanche and his leg was broken. There was nothing to do but bind up the leg, making a splint of the broken camera tripod. At this point, the path was so narrow there was no place to put him except in the middle of the trail. The forty mules in the caravan eventually came along and stepped over him, one after the other. Sure-footed beasts that they were, not one stepped on him. Later he reached Chengdu and after receiving crude medical assistance, started on his long way back to America, but the leg never healed properly and he always retained a slight limp.

The lily bulbs were eventually dug, encased in clay, packed in charcoal and were shipped out at what Wilson called "silk rates." This beautiful lily is one of the most popular in the United States, is widely grown in Europe, and is one of the most popular of over 200 of Wilson's introductions from China.

His second trip for Veitch was taken to find and send back living plants of the beautiful Yellow Poppywort, (*Meconopsis integrifolia*); a trip covering 13,000 miles and taking 2½ years. This plant was also found in the Tibetan-China border, at an altitude of 11,000 feet, near Tachien-lu. The flowers of this beautiful species are yellow and 8 inches across, borne on stems 2-2½ feet tall. The valley in which he found it was emblazoned for miles up the mountainside with thousands and thousands of these beautiful flowers. He felt that finding this one species and introducing it to England, was well worth the extensive trip.

Yichang is about 1000 miles west up the Yangtze River from its mouth, and it was here that Wilson's

plant hunting started. The river up to this point was plied by many steamers. The land on either side was alluvial, mostly cultivated, and many people from foreign countries had seen it and lived in it, so that it had little to offer as far as new plant materials were concerned.

Traveling up the Yangtze beyond Yichang was extremely slow; a trip of 400 miles to Chongqing (Chungking) took a month. Over a thousand rapids and rocks throughout these magnificent gorges made it a most arduous trip. It was in the large area from Yibin to Songpan (Sungpan) in northwestern Sichuan where Wilson spent most of his time, for this was the area overlooked by previous plant hunters. Range after range of razor-backed mountains cut through this area, ranging from 8,000 to 16,000 feet, at which point the permanent snowline began and beyond which there were few plants but alpinists.

The valleys in these mountain ranges were anywhere from 4,000 to 9,000 feet in altitude, but the climate was more moderate than it was in the lowlands. It was in these valleys, many of them uninhabited and devoid of any crop growing, that Wilson found so many things never before recorded.

He liked Songpan and said that he would have liked to live there permanently. The sky seemed to be always blue, he needed a blanket almost every night in the summer, yet the winter was not too cold. The food was good and plentiful. Pear, apple, apricot, peach, walnut and mulberry all thrived there, although the forests had all been cut down so that most of the mountainsides were treeless. It was there that he found *Rosa hugonis* plentiful, the only yellow rose he knew of native in China.

Chengdu (Chengtou Fu) he found to be walled, the huge wall being nine miles in circumference, 66 feet broad at the base, 35 feet high and 40 feet broad at the top, apparently being kept in good repair.

Among other things in the valleys of this great area he found 65 different Clematis, 69 honeysuckles, 35 *Vitis*, 40 *Berberis*, 40 *Virburnums* and 110 species of *Senecio*. He collected 80 species of *Rhododendron*, introducing 50 of them for the first time. Of over 200 plants he discovered in China and introduced into America, none of them known to science at the time, over half of them are among the most ornamental of our landscape plants today.

Traveling through the wild and bandit-ridden country that he did, Wilson sometimes had to hire soldiers to protect his men and equipment from robbers. He tried to live off the land wherever possible and had few good things to say about the miserable hovels where he had to stay overnight. Frequently just a thatched or slate roof over the ground was the hostel, and when it rained the ground became one sticky mass of mud. On other occasions there were no windows and merely a hole in the roof for the smoke to escape from a smoldering fire. Often animals were sheltered under the same roof, and lice-infested bedding always proved an extra hazard.

The side trails he took were nothing more than single paths strewn with rocks and boulders over which his men had to crawl. There were many times going up and down mountains, when his sedan chair had to be dismantled and carried piecemeal. Streams were always hazards, sometimes being crossed on foot, other times

Left: A Wilson photograph showing the structure of a bamboo suspension bridge, laid on eight cables each a foot in diameter and suspended from two similar cables on either side. The floor is of rough wicker work. Shih-chuau Hsien, altitude 2,700 feet — August 12, 1910.

Photograph by E. H. Wilson.
Permission to use this photograph granted by the Arnold Arboretum.
© President and Fellows of Harvard College, 1976.

by crude bamboo bridges which always presented the possibility of breaking and causing injury or loss of equipment. Occasionally he would come to one that was simply a strand of bamboo culms woven together, on which was attached a sliding cradle to which a man was strapped, and slid from a high elevation on one side to a lower one on the other.

Photography was very difficult during those early times. Wilson realized the great value of bringing back good pictures of the plants he saw as well as seeds and herbarium specimens. In addition to a small roll type camera for snapshots, he selected a Sanderson camera, a huge boxlike affair that had to be packed in three heavy boxes. It had a long bellows, had to be mounted on a heavy wooden tripod, and took 8½ by 6½ inch pictures on glass plates. Eventually he had accumulated 850 of those exposed glass plates. Once he mentioned having to cut down three large trees, removing large amounts of brush — work taking several hours — in order to get sufficient light to photograph just one specimen.

Today, with our modern, quickly applied telephoto lenses, it is a simple matter to photograph a flower high up in a tree, but Wilson had to climb the tree, haul up the heavy camera with ropes and finally take his photograph, often balanced precariously on a tree limb. After he had taken his pictures, one can only conjecture the many difficulties he had carrying the heavy glass plates, crossing flimsy bamboo bridges, wading through rushing torrents and balancing the heavy boxed plates on porters' backs as they trudged over difficult mountain passes. Some he lost when his boat turned over in a rushing mountain stream; others were probably broken by careless porters. He and other early photographer-plant hunters should be given much credit for their picture taking done under such trying conditions.

Of the several hundred plants which Wilson discovered in China during his eleven years there, not all were woody plants. He collected a great number of things which had already been described, but not introduced, to America or Europe. Only a few of the ornamental plants he introduced can be mentioned here but a majority of these are among the most popular landscape plants we use today.

Acer griseum — Paperbark Maple. Growing about 25 feet tall, this tree has cinnamon colored bark that exfoliates in strips similar to that of the birch tree. It is rather difficult to propagate but has the most interesting bark of all the maples.

Actinidia chinensis — Kiwi fruit. A vigorous twining vine, with sexes on separate plants, the edible cylindrical fruits are about two inches long. The species is now being grown in considerable quantity on the northwest Pacific Coast for the commercial production of the fruits frequently seen now on the fruit shelves of our grocery stores. It was discovered by Robert Fortune in 1849, but Wilson is given credit for introducing it.

Berberis verruculosa — Warty Barberry. A leathery evergreen with spiny leaves about an inch long and black, bloomy berries. The foliage has a slightly bronze autumn color. It is one of the barberries that is not an alternate host for the wheat rust, and so is allowed in wheat growing areas.



photograph by Donald Wyman

Acer griseum — Paperbark Maple

Buddleia davidii magnifica — Oxeye Buddleia. Growing about 15 feet tall, the flowers are small, dark bluish lavender with an orange eye and are produced in eight inch spikes two inches wide. Well fertilized specimens can produce flower spikes as much as 22 inches long, blooming in late summer. This is one of the handsomest of all the buddleias.

Clematis armandii — Armand Clematis. Only hardy in the warmer parts of the United States, this vigorous evergreen vine produces flowers two inches wide, white changing to pink. It is widely used in England. Since the flowers are produced on wood made the previous year, it should not be pruned until it is through blooming.

Clematis montana rubens — Pink Anemone Clematis. With rosey red to pinkish flowers 2-2½ inches wide, this also blooms on wood made the previous year. It can climb more than 20 feet high.

Cornus kousa chinensis — Chinese Dogwood. Blooming two weeks after our native *Cornus florida*, this is one of the most ornamental of the small landscape trees we have in our gardens today, with flat horizontal branches, flower bracts that are pure white and 2-2½ inches long, borne on the top side of the branches. The fruits are bright red, similar to large raspberries.

Cotoneaster apiculata — Cranberry Cotoneaster. The bright red fruits are 3/8 inches in diameter and appear on the flat sprays in the fall. It seldom grows over three feet tall and so makes an excellent ground cover.

Cotoneaster dammeri — Bearberry Cotoneaster. An even better evergreen ground cover than the above, about a foot tall with bright red fruits in the fall. The evergreen leaves are only about an inch long. It was introduced by Wilson, but found earlier by Henry.

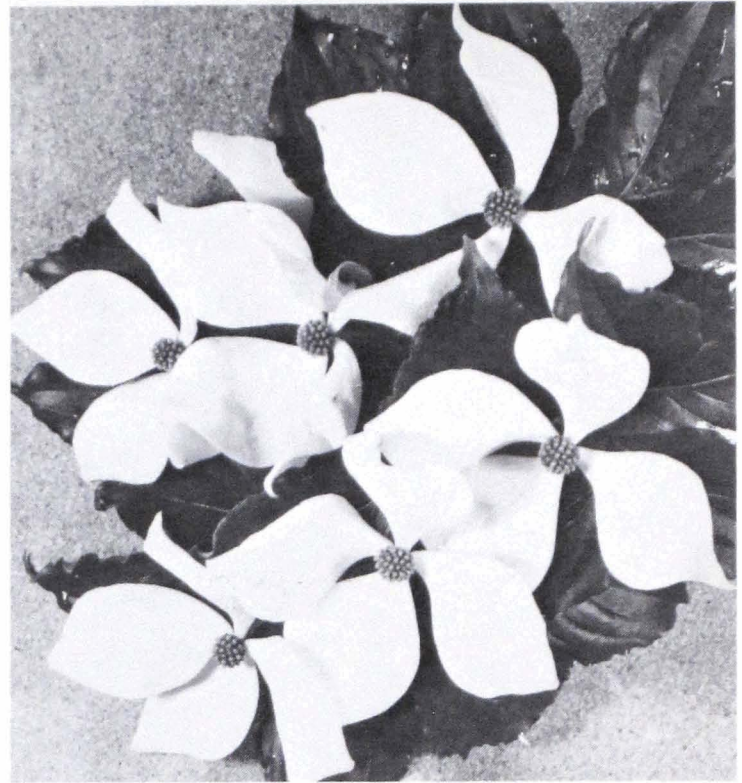
Cotoneaster salicifolius floccosus – A shrub about 15 feet tall, semi evergreen and hardy in the mid-South. The narrow leaves are three inches long and the small red berries are borne in profuse clusters during the fall.

Davidia involucrata – Dove Tree. Finding this interesting tree and sending back fruits to England was the objective of Wilson's first trip to China. The two white flower bracts are borne in June, the larger one being as much as 6 inches long. The fruit is a nut. An unusually graceful tree in bloom, sometimes called the Handkerchief Tree, it is hardy as far north as Boston.

Ilex pernyi – Perny Holly. The glossy evergreen leaves are ½-1¼ inches long and the bright red fruits are borne on the female plants. It is a small tree, growing up to 30 feet in height and because of the very prickly leaves, can make an impenetrable hedge.

Jasminum mesnyi (primulinum) – Primrose Jasmine. The most beautiful jasmine grown in America, it is only hardy in the extreme southern parts of the United States. Its large yellow flowers are 1½ inches wide and appear during spring and summer. It is a bushy subshrub about 10 feet tall.

Kolkwitzia amabilis – Beautybush. One of the most popular ornamental shrubs in America today with profuse, small, trumpet shaped, pink flowers in June followed by hairy brown seeds that remain on the plant until winter, it can grow 10 feet tall. It is interesting to note that Wilson never saw it in bloom in China, he merely collected seed in passing just on the chance that it might have merit. Several years later he saw it in bloom in the Arnold Arboretum for the first time, grown from seed that he had sent earlier.



photograph by Donald Wyman

Above: *Cornus kousa chinensis* – Chinese Dogwood (detail)

Below: *Cornus kousa chinensis* – Chinese Dogwood



photograph by Donald Wyman



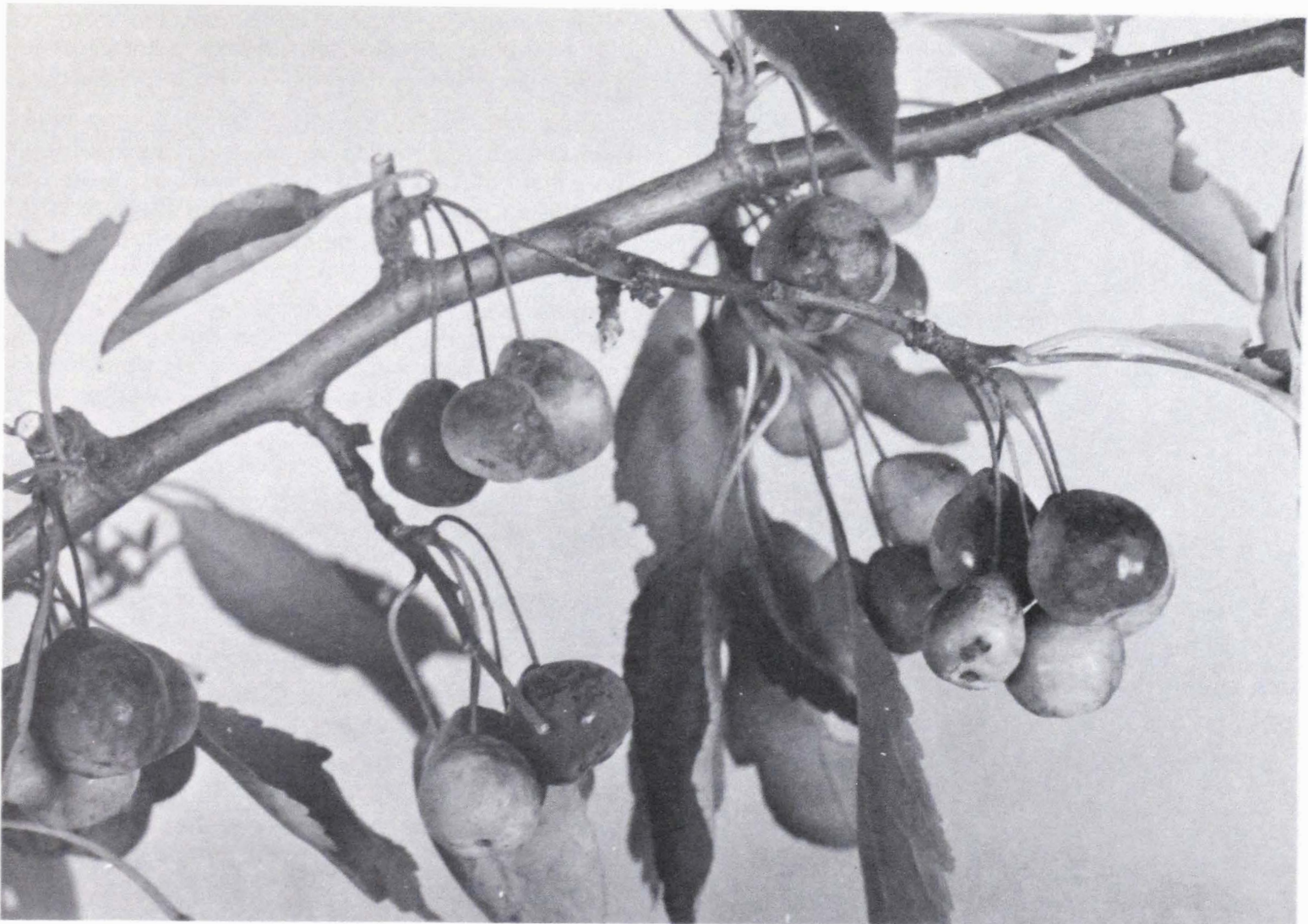
Davidia involucrata – Dove Tree (detail)

photograph by Donald Wyman

Davidia involucrata – Dove Tree



photograph by Donald Wyman



Malus toringoides – Cutleaf Crab Apple

photograph by Donald Wyman

Lilium davidii – David Lily. A vigorous growing lily, 5 feet tall with 2-20 small red flowers on a stalk in mid July.

Lilium regale – Regal Lily. Probably the best known of all Wilson's Chinese introductions, it grows 4-6 feet tall, has large white trumpet shaped flowers flecked with pink on the outside and yellow inside. Well grown plants have produced as many as 30 gorgeous flowers on a stalk.

Lilium sargentiae – Sargent Lily. Somewhat similar to the Regal Lily except that it produces many bulbils in the axils of the leaves.

Lilium willmottiae – Willmott Lily. Flowers orange-red spotted with brown, drooping, and 2-3 inches across.

Lonicera henryi – Henry Honeysuckle. A twining evergreen vine with profuse reddish flowers and black fruits, making an excellent ground cover.

Lonicera maackii podocarpa – Late Honeysuckle. The tallest of the honeysuckles growing over 15 feet tall. Although the flowers appear in June, the small, red,

fleshy berries do not color until mid fall and remain on the plant until November. It is the last of the honeysuckles to display their fruits.

Lonicera nitida – Box Honeysuckle. A small 6 foot high shrub with creamy white fragrant flowers in spring and half inch long leaves, making an excellent clipped hedge.

Lonicera tragophylla – Chinese Woodbine. Twining vine with bright yellow flowers borne in large terminal heads of 10-20 flowers. It grows best in semi-shade.

Magnolia wilsonii – Wilson Magnolia. Tree growing to 24 feet high with white, saucer-shaped, fragrant pendulous flowers in August. The flowers are 3-4 inches in diameter and have a conspicuous ring of red stamens in the center.

Malus hupehensis (theifera) – Tea Crab Apple. A small, fan shaped tree, so named because the natives of central China made a tea from the foliage. The flower buds are pink, the flowers white and the fruits are a dull



photograph by Donald Wyman

Malus toringoides – Cutleaf Crab Apple

Lilium davidii – David Lily. A vigorous growing lily, 5 feet tall with 2-20 small red flowers on a stalk in mid July.

Lilium regale – Regal Lily. Probably the best known of all Wilson's Chinese introductions, it grows 4-6 feet tall, has large white trumpet shaped flowers flecked with pink on the outside and yellow inside. Well grown plants have produced as many as 30 gorgeous flowers on a stalk.

Lilium sargentiae – Sargent Lily. Somewhat similar to the Regal Lily except that it produces many bulbils in the axils of the leaves.

Lilium willmottiae – Willmott Lily. Flowers orange-red spotted with brown, drooping, and 2-3 inches across.

Lonicera henryi – Henry Honeysuckle. A twining evergreen vine with profuse reddish flowers and black fruits, making an excellent ground cover.

Lonicera maackii podocarpa – Late Honeysuckle. The tallest of the honeysuckles growing over 15 feet tall. Although the flowers appear in June, the small, red,

fleshy berries do not color until mid fall and remain on the plant until November. It is the last of the honeysuckles to display their fruits.

Lonicera nitida – Box Honeysuckle. A small 6 foot high shrub with creamy white fragrant flowers in spring and half inch long leaves, making an excellent clipped hedge.

Lonicera tragophylla – Chinese Woodbine. Twining vine with bright yellow flowers borne in large terminal heads of 10-20 flowers. It grows best in semi-shade.

Magnolia wilsonii – Wilson Magnolia. Tree growing to 24 feet high with white, saucer-shaped, fragrant pendulous flowers in August. The flowers are 3-4 inches in diameter and have a conspicuous ring of red stamens in the center.

Malus hupehensis (theifera) – Tea Crab Apple. A small, fan shaped tree, so named because the natives of central China made a tea from the foliage. The flower buds are pink, the flowers white and the fruits are a dull



photograph by Donald Wyman

Clematis montana rubens – Pink Anemone Clematis
(detail)

reddish color. It is very popular in American gardens because of its picturesque fan shape.

Malus toringoides – Cutleaf Crab Apple. A small tree about 25 feet tall with fruits slightly pear shaped and $\frac{3}{4}$ inches long, red on the side exposed to the sun and yellow on the shaded side. Wilson thought this was one of the most ornamental of all the crab apples.

Picea asperata – Dragon Spruce. Growing 75 feet tall, this pyramidal, dense, evergreen has very stiff and pointed needles that can remain on the tree as long as 7 years. It is excellent for seashore planting.

Potentilla fruticosa veitchii – Veitch Bush Cinquefoil. A low shrub, 4 feet tall with small white flowers blooming in late spring and needing practically no attention whatsoever. Wilson named it after his first benefactor.

Pyrus calleryana – Callery Pear. A tree, 30 feet tall with profuse white flowers and small reddish fruits only a half inch long, this has been found to be the least susceptible of all the pears to the serious pear blight. The foliage turns an excellent glossy red in the fall.

Rhododendron fargesii – Père Farges' Rhododendron. An evergreen shrub to about 10 feet tall with pink to rose colored, bell shaped flowers, $1\frac{1}{2}$ inches in diameter during April.

Rhododendron orbiculare – Globe Rhododendron. With round evergreen leaves 2-4 inches across and rose colored flowers $1\frac{1}{2}$ inches wide.

Rhododendron williamsianum – Williams Rhododendron. Only growing about 5 feet tall its branches are more or less horizontal making it a desirable evergreen specimen. The pink flowers are 2 inches across.

Rosa moyesii – Moyes Rose. Nine feet tall, this rose has blood red flowers $2\frac{1}{2}$ inches in diameter during June. The fruits are deep orange red, $2\frac{1}{2}$ inches long.

Rosa omeiensis – Omei Rose. Sometimes growing 12 feet tall, this vigorous shrub has pear shaped red fruits on yellow fruit stalks that make it unique in the rose clan. The single flowers are white, but the large bright red prickles along the stem make it conspicuous indeed. Wilson did not discover this rose but he did introduce it.

Sarcococca hookeriana humilis – Low Himalayan Sarcococca. A low, broad leaved evergreen, 1-3 feet tall, with lustrous leathery leaves and fragrant white flowers in mid spring. Useful as an evergreen ground cover.

Sarcococca ruscifolia – Fragrant Sarcococca. Taller than the above with dark scarlet fruits $\frac{1}{2}$ inch in diameter and fragrant white flowers. This is another plant discovered by Henry but introduced by Wilson.

Sorbaria arborea – Tree Spirea. Growing 18 feet tall with loose branching and small white flowers borne in clusters a foot long. It spreads considerably making it too rampant a grower for small gardens.

Spiraea veitchii – Veitch Spirea. The tallest of the true spireas, up to 12 feet tall with flat white flower clusters about 2 inches across, in June.

Syringa pinnatifolia – Pinnate Lilac. A bushy, 12 foot tall lilac, unique among the lilacs because the leaves are pinnate, often with 11 leaflets. The flowers are white in 3 inch long panicles.

Syringa reflexa – Nodding Lilac. A very graceful shrub with nodding clusters of pink flowers, each cluster about 4-9 inches long. Strangely enough, this beautiful lilac is used far more in Scandinavian countries than it is in America.

Viburnum davidii – David Viburnum. Only 3 feet tall, this evergreen makes an excellent ground cover in gardens on the Pacific Coast where it grows much better than it does in the East. The leathery leaves are interesting, the small berrylike fruits are light blue and appear early in the fall. A truly handsome foliage plant.

Viburnum rhytidophyllum – Leatherleaf Viburnum. Up to 9 feet in height, this has handsome crinkled leaves and is evergreen in the warmer parts of the South. The berrylike fruits are borne in clusters and are red to black, making the plant most outstanding. Wilson greatly admired the foliage, flowers and fruits of this shrub and said that it should be included in every shrub collection.

The introduction of Chinese plants to America did not stop with Wilson's plant hunting trips in 1910. Others have contributed much, especially botanists sent out by the U.S. Dept of Agriculture to bring back clones of purely economic plants. Frank N. Meyer did much in this respect.

Even as late as 1945 a new plant was introduced from China. It had been found the year before, but was unidentified and had merely been an herbarium specimen in a large collection that was being identified at the Arnold Arboretum. It was determined to be *Metasequoia glyptostroboides*, later popularly called Dawn Redwood, and known only from paleo-botanical records as

having existed at several places on the earth's surface in Mesozoic times. Hence there was no record of living plants anywhere – up to that time – for a million years or more. The Arnold Arboretum financed an expedition to an obscure valley on the Sichuan-Hubei border, noted on the herbarium sheet, had seeds collected and then distributed them all over the temperate regions of the world. The introduction of this plant in modern times is proof that China still has possibilities as a source for new plants.

China, over the years, has given American gardens more ornamental and economic plants than any other country in the world. We owe a debt of gratitude to many individuals for aiding in their introduction, but no one person has contributed more to our gardens, thanks to his eleven years of plant hunting in that vast country, than Ernest Henry Wilson.

Donald Wyman is Horticulturist Emeritus of the Arnold Arboretum of Harvard University. His numerous books on gardening include: Dwarf Shrubs; Maintenance-Free Woody Plants for Today's Gardens, Shrubs and Vines for American Gardens, and the prestigious Wyman's Gardening Encyclopedia. Dr. Wyman is an authority on botanist E.H. Wilson whom he succeeded as horticulturist at the Arnold Arboretum.

Malus hupehensis (theifera) – Tea Crab Apple



photograph by Donald Wyman

WILLIAM W. CADBURY, M.D.,

Quaker Missionary and Orchidologist in China

by

Howard Page Wood, M.D.

A few years ago, the Academy of Natural Sciences received a collection of paintings of Chinese orchid plants, which have attracted the interest and curiosity of staff and members who have seen individual examples decorating offices or laboratories. These pictures are the bequest of Dr. William Warder Cadbury, a Philadelphia Quaker who spent his professional life as a medical missionary in Canton, China, and established a garden of orchid plants. The painter we know only as a Filipino named Gomez. Dr. Cadbury commissioned him in 1940-42 to paint the plants as they bloomed, producing what he hoped would be illustrations for an orchid "Flora" of South China. It therefore seems appropriate to record some notes on Dr. Cadbury's life and work as well as his hobby. Renewed American friendship with, and interest in, China give his story contemporary relevance.

Dr. Cadbury was born in Moorestown, New Jersey in 1877, a member of a large and distinguished Quaker family. His brother, Henry, became an outstanding Biblical scholar and Quaker leader; a co-founder of the American Friends Service Committee. William graduated from Haverford College in 1898 and remained for a graduate year in biology. After studying medicine in Vienna, he interned at Pennsylvania Hospital. His interests centered on infectious diseases and pathology, and he accordingly joined the staff of the Henry Phipps Institute for Study, Treatment, and Prevention of Tuberculosis in Philadelphia, there becoming librarian and pathologist in addition to his work with patients. In 1909 he traveled to Canton to begin a missionary career which was supported throughout by members of the Society of Friends in Philadelphia.

Upon his arrival he became Instructor in Materia Medica and Therapeutics at the University Medical School, which was sponsored by the Christian Association of the University of Pennsylvania. When this school moved to Shanghai in 1914, he continued teaching at the Hackett Medical College for Women. He soon joined two other missionary organizations, becoming chief of internal medicine at Canton Hospital and physician to Canton Christian College, which later became Lingnan University.

A bit of background should place in perspective Dr. Cadbury's role in Canton. Fortunately, in 1935 he and

his niece, the Quaker author May Hoxie Jones, published a centennial history of the Canton Hospital, *At the Point of a Lancet*, from which I have taken most of the following historical material.

China had welcomed Christian missionaries during the reign of Kublai Khan in the 13th century, but subsequent rulers came to see Western culture as a threat to Chinese traditions. Thus, after 1745, Western contact was limited to traders using the port of Canton, located ninety miles up the Pearl River from the Portuguese colony of Macao. Teaching Christianity in China was specifically forbidden. By the early 1800's, however, the Protestant missionary movement was under way, and an ingenious method was devised to penetrate China. It was proposed to send Christian physicians who would render free care to the native population, in the hope that the natives' minds might at the same time be made receptive to the Gospel. Accordingly, the first medical missionary, the Yale-trained American physician Peter Parker, arrived to establish the Canton Hospital in 1835. Choosing an efficient way of doing the greatest good for the greatest number of the severely ill, he concentrated on the surgical treatment of blindness. This affliction was epidemic in the Far East, particularly because of the viral disease, trachoma. Thus was founded the first hospital in China. To govern and support it, American, English, and Scottish residents of Canton set up the first medical missionary society.

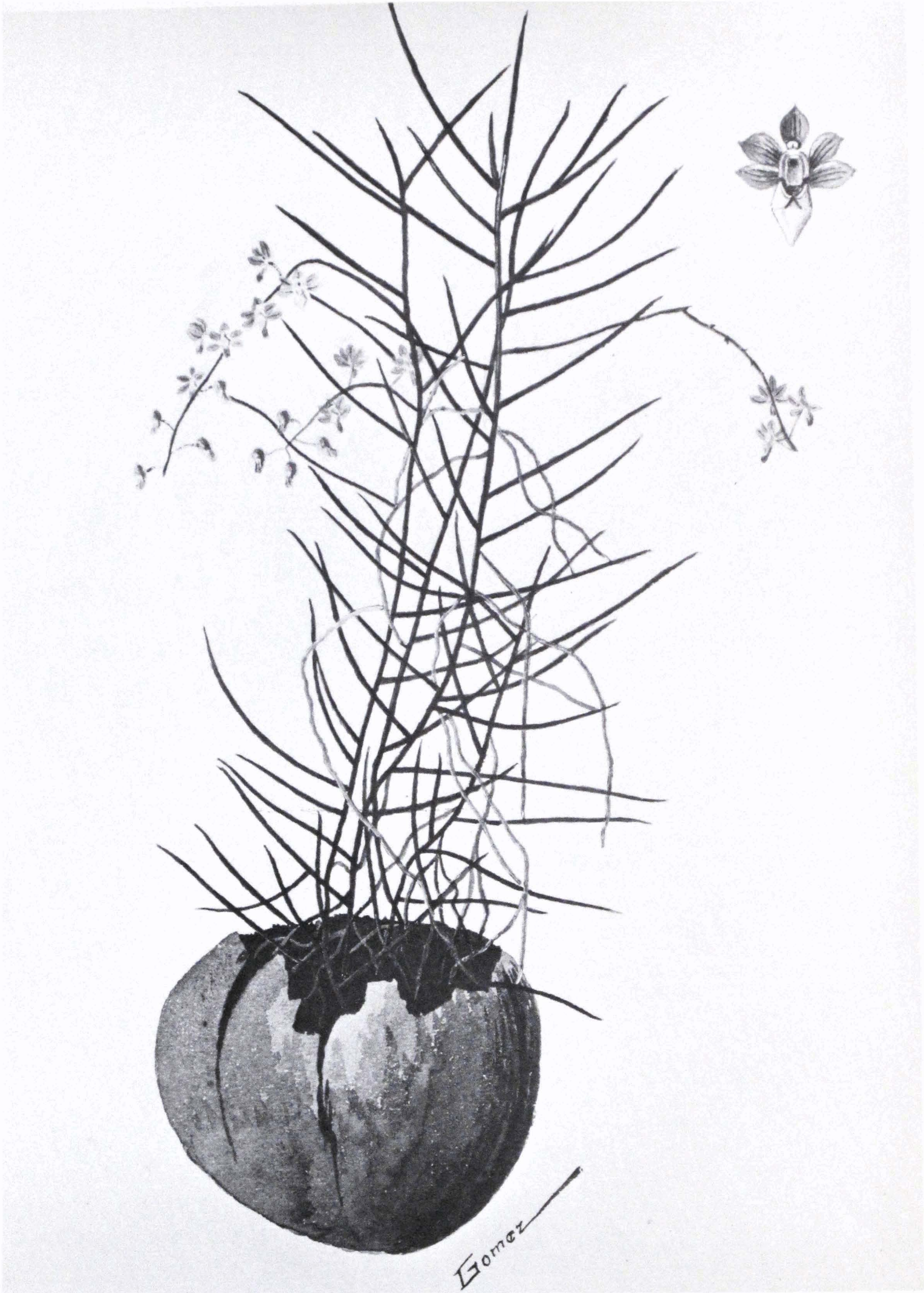
The Canton Hospital endured xenophobia, war, fire, staff crises, and revolution. It trained the first Chinese doctors to use modern medicine, including Sun Yat-sen, who spent a year there in 1886. Dr. Sun, a Cantonese who had grown up in Hawaii, later abandoned medicine to become founder of modern China. In 1858, after defeats by the British, French, and Russians, China agreed to the free admission of foreigners. By 1935 there were in China 350 medical missionaries, 250 mission hospitals, 18 medical schools, and a total of 7000 doctors.

William Cadbury joined the staff of the Canton Hospital just before the fall of the Manchu dynasty and also at the time of crisis for the hospital. Under the charismatic direction of Dr. Parker and his successor, Dr. John G. Kerr, the hospital had flourished, offering a widening range of services, until Dr. Kerr resigned in 1899. Thereafter the leadership faltered, and the governing board determined to set up a modern hospital organization headed by a staff of specialists, each in charge of his own department. Dr. Cadbury was made the first chief of staff, and he remained chief of internal medicine throughout his service in China. When, in 1930, the hospital and Hackett Medical College were united with Lingnan University under Chinese direction, Dr. Cadbury was appointed Superintendent of the hospital. By 1935 a new medical school-hospital complex, named for Sun-Yat-sen, was under construction. Thus, just before the Japanese occupation in 1937, Dr. Cadbury saw, with satisfaction, the conversion of the hospital mission into a modern medical center belonging to the Chinese themselves. The medical work of the missionaries had itself achieved results more significant than their 19th century sponsors could have imagined when they introduced it as a means for spreading Christianity.



Sarcanthus cerinus

The Academy of Natural Sciences



Sarcanthus teretifolius

The Academy of Natural Sciences

William Cadbury's first marriage to Sarah Imbree Manatt in 1911 was short-lived; she died in the following year. In 1917 he married Catharine Balderston Jones in Canton. Catharine was the sister of the most revered Quaker of the 20th century, Rufus Jones, philosophy professor at Haverford, who with Henry Cadbury had founded the Friends Service Committee. Rufus Jones, also widowed, had taken for his second wife the Cadbury's older sister, Elizabeth. William and Catharine had three daughters. In addition, they took in the infant son of the Chinese general, Lei Fuk Lam, and raised him as part of the family. General Lei contributed funds to construct a small hospital and clinic on the Lingnan campus, operated under Dr. Cadbury's direction and later moved to Canton Hospital.

Dr. Cadbury described the development of his orchid hobby, and its role in his World War II experiences, in a poignant 1945 article, "Recollection of My Orchid Garden in Canton, China." His interest in orchids was kindled before 1920, when he was given four *cymbidium* plants by one of his Chinese medical students. These plants had survived over 25 years at the time he wrote his article. Lingnan botanists later gave him plants collected from various areas of China. Traveling friends made other contributions, and he bought plants in the Philippines. By January, 1943, he was growing 344 plants representing 47 genera; of his 116 species, 90 were native to China. In Canton, close to the Tropic of Cancer, roughly at the latitude of Key West, the minimum temperature is approximately 40° F. Dr. Cadbury was, therefore, able to attach most epiphytic specimens to trees. These plants he often placed in coconut half-shells containing bits of brick, osmunda fern root fiber, and charcoal. This method is still widely used for growing epiphytes in Southeast Asia. Terrestrial orchids he planted in pots containing chunks of Canton mud. He constructed a lath house of bamboo with a cistern in the middle and he glazed a porch and added a stove for winter care of the tenderest species. He was pleased to note that something was in bloom at all seasons. The Chinese, he observed, were much more impressed with the fragrance than with the appearance of the flowers. Hence, they favored the small native *cymbidium* species over the more spectacular *cattleyas* and *dendrobiums*.

Dr. Cadbury apparently had considerable freedom during the early years of his Japanese captivity. He lived in his home on the Lingnan campus. During this time he studied his plants and made notes for his orchid "Flora" of South China. He hired the artist Gomez to paint the flowers for future illustrations.

When in February, 1943, the Japanese removed him to an internment camp in Canton, Dr. Cadbury was allowed to take 11 favorite orchid plants, chosen to allow continuous bloom. "These old friends helped to overcome the ennui of the long days of waiting." His garden was left in the care of a friend who was a distinguished Chinese botanist (unnamed). Dr. Cadbury busied himself by writing up his notes for the "Flora." In August, 1943, he was repatriated on the S. S. Gripsholm. Unfortunately, he was not allowed to take his manuscript or notes with him. "Thus I only have memory to count on, but I had lived so intimately for many years with my flowers that they have become almost a part of myself."

After repatriation, Dr. Cadbury lived and worked at Friends Hospital. This psychiatric facility has always prided itself on its azalea gardens and greenhouses, which are part of the therapeutic program. In this instance, the horticultural environment may have helped to heal the spirit of the physician as well as his patients. After the Japanese surrendered, the Cadburys returned to Lingnan, and he wrote another article, describing his *dendrobium* and *habenaria* species. This paper retains a scientific tone until the last paragraph, when his personal optimism shows through:

It is a great satisfaction to know that at long last the territory of South China and especially the island of Hainan and of Hongkong have been liberated from the Japanese occupation. It will soon be possible again for nature lovers to explore these interesting regions.



The Academy of Natural Sciences

Vanda



Goodyrea procera

The Academy of Natural Sciences

Unfortunately, the victorious Maoists of 1949 wanted nothing to do with missionaries, and American refusal to recognize the new government made us officially "foreign devils" again. Dr. Cadbury, at 72, finally had to abandon his life work and his avocation as well. He retired to Moorestown, where one of my informants remembers him as a "broken man," another as simply disillusioned and discouraged. He died on his 82nd birthday, October 15, 1959. The fate of his manuscript is unknown. During his retirement he did not entirely lose touch with the world of botany. On trips with his wife to Massachusetts for her Wellesley College reunions, he would stop at the Arnold Arboretum to see the Chinese botanist, Dr. Shiu Ying Hu, authority on the flora of Hongkong. Dr. Hu tells me that many years before, as a Lingnan graduate student, she had taken undergraduates to see the *pandanus* tree in Dr. Cadbury's garden. (The *pandanus* is native to Hongkong but not Canton.) Dr. E.D. Merrill, an old friend of Dr. Cadbury's and director of the Arboretum, had been pleased to report to Dr. Cadbury that he had a Chinese student from Lingnan.

The *pandanus* tree brings me to my own connection with Dr. Cadbury, which really began with my father's childhood interest in stamp-collecting. In 1910, at age 11, he began to correspond with Dr. Cadbury to obtain Chinese stamps. In 1921 he went to Lingnan as a missionary teacher sponsored by the Student Volunteer Movement, and evangelical groups which sent out thousands of missionaries for two generations, and which also influenced Dr. Cadbury. In due time, my mother joined my father in Canton, and they were married in Dr. Cadbury's living room. Their wedding picture shows in the background a spike-leaved tree which I like to think is a *pandanus*. My parents returned to the United States after Dr. Cadbury informed my mother that giving birth to me would require a Caesarean section, and I was born in Philadelphia.

Our family never went back to China but kept in touch with the Cadburys. I well recall Dr. Cadbury as a short, slim, straight figure, with balding head, quiet voice, and twinkling eyes. He seemed much more the careful medical scientist than the inspiring missionary. His youngest daughter, Catharine, graduated with me from Westtown School. As my interest in medicine and psychiatry developed, I visited him at Friends Hospital in the 1940's. When I opened my practice in 1954, he wrote me the following:

I started in at 4044 Chestnut Street in 1905 – and while you are taking up psychiatry I took up internal medicine and joined the staff of the Henry Phipps Institute which has recently celebrated its 50 years of work in tuberculosis. At that time T.B. was considered the most ravishing disease of mankind, but is now considered all but placed under control. Perhaps 50 years from now you will have done something of the same kind with mental disease. If I were starting out now on a medical career I think I too should choose psychiatry as the field where there is perhaps the greatest need and most hope of real progress.

A few years later, when I too had become an orchid hobbyist, I came upon his two papers in the "American Orchid Society Bulletin" purely by accident. I had known nothing of his work with plants. Quite recently,

while doing library research on orchids at the Academy, I learned about the acquisition of the Gomez paintings, and it was suggested that the Academy community would be interested in the story behind them.

Dr. Cadbury represented two old but enduring traditions: the physician-botanist and the Quaker naturalist. Until recent years, all physicians had to be botanists because they obtained their medicines from herbs. Medical men contributed a large share of the biological research of the 18th and 19th centuries. Think of Linnaeus and the Academy's own Joseph Leidy. Quaker naturalists have also been prominent in the life of the Academy, with Witmer Stone only one example. Quakers traditionally disapproved most forms of culture or diversion, but nature study was always an exception. I have fond early memories of visits to the Carter bird museum at Westtown. Until recently science classes at Philadelphia Friends schools were delighted by the visits of William's nephew, the naturalist Joseph Cadbury.

Perhaps with renewed friendship between China and the United States, an American orchidist will visit Canton some day and find Dr. Cadbury's manuscript in the care of Chinese botanists. It would please him to know that his study of orchids, like his medical teaching, has bridged the gap between peoples.

Howard P. Wood is a practicing psychiatrist. An avid orchid grower, he is a member of the Philadelphia Botanical Club and the Academy of Natural Sciences.



Ilene Berg, National Zoological Park, Smithsonian Institution

Hsing-Hsing, the National Zoological Park's male giant panda, peers out from behind his morning meal of bamboo.

CONSERVATION IN CHINA: 1980

by
S. Dillon Ripley

A recent visit to China, including the Autonomous Region of Tibet, has given me a chance to renew contacts with Chinese scientists and administrators concerned with conservation as well as the collection of scientific data in natural history fields in that vast country. The occasion was the holding of a first International Symposium on the geology and biogeography of the Tsinghai-Xizang Plateau Region, as the enormous upland plateau area of Chinese central Asia is sometimes called. The proceedings consisted of a week-long symposium in Beijing itself, followed by a flight to Chengdu, and on to Lhasa, which now boasts a large airport about two hours motor drive south and east of the city along the Tsangpo River.

During the week in Beijing I had an opportunity to meet with officials who, in one way or another, represent agencies concerned with aspects of conservation as presently understood in China. The senior organization in the country for the amassing of scientific data is the Academia Sinica; a revered scientific complex, numbering a very large group of "institutes" spread all over the country, and including study centers in astronomy, geology, palaeontology and many branches of biological study. Museum and laboratory oriented although much of this work may be, yet these studies and the scientists involved contain the basic store of scientific knowledge on which conservation must be based. Additionally, the Ministry of Forests holds title to natural areas of land, containing timber and by inference, wild animals and plants. Thus this Ministry has a responsibility to control access to such land, much of which consists of the remaining wild or semi-undisturbed land in the nation. Such areas tend to be inhospitable and inaccessible, therefore still undeveloped, and to include within them, as in the mountain area of west China proper, remaining populations of wild species, often in forest areas called "reserves." I believe that the term "reserve" may refer to forest reserves, in essence, rather than to game reserves or national parks as we would understand them in the United States.

In 1979 China created a new organization, the Environmental Protection Agency, whose Director, Mr. Li Chaobo, is responsible to the Council of Ministers. This Agency, roughly equivalent to our own EPA in the Federal Government, is more broadly concerned with questions of industrial pollution, and environmental planning

for the public good, than questions of conservation of animal life. They thus defer to the Ministry of Forests. Additionally, there is a governmental Chinese Association for Science and Technology which has a broad overall advisory role in programs involving science, including conservation. Their administrative mandate includes public understanding of science and science education through displays, exhibits and museum activities, thus to some extent overlapping the work of the Academia, although the Association is not expected to undertake original scientific research.

Finally, insofar as knowledge of current conditions in regard to natural history is concerned, there is a body of information to be gleaned from the zoos, which are numerous, scattered throughout the country in the principal cities, but which, being administered municipally, and not by any central authority, tend to be competitive among each other, and not cooperative. The actual population of wild animals such as rare species like pandas and cranes, found in such zoos is surprising, and represents a kind of incidental intelligence source on the status of the species in the wild. One can learn more for example about the status of the S. China subspecies of the tiger, *Felis t. amoyensis*, virtually unobserved in the wild state in the last generation, by talking to the authorities of the Shanghai Zoo, which seems to have a monopoly on rearing this rare form from Fukien at the present time, and whose employees have actually been to the wild habitat of the animal (which occasionally produces the "blue" morph of the tiger, as Rewa in Madhya Pradesh in India has produced the "white" morph, so celebrated in zoos in this country and in England).

Based on conversations in Beijing, it can be realized that wildlife conservation as we know it in the West is not a high priority at the present time. As one of the principal Ministers, and someone I have known for ten years said to me, "the real problem is how to feed the people. Basic science and art have very little influence in our scale of priorities." Although culture, science and art are torch bearers in the Western world, perhaps it would be fair to say that in China they are important as aspects of cultural history, as symbols of the ancient cultural superiority of the Han.

Our subsequent field trip, accompanied by new and old friends in the Chinese scientific community, was as much an eye-opener for many of them as it was for some eighty foreign scientists from 17 countries. We motored 1000 kilometers across southern Tibet through the outer plateau area, demarcated for the most part by river systems running into the Tsangpo system, which emerges into the Assam plains hundreds and hundreds of kilometers to the southeast as the Brahmaputra River. To the south lay the tortured ridges of the Great Himalaya, to the north the little-known ranges of the Trans-Himalaya. These huge mountains, towering all about, representing crustal fragments of undersea beds of Mesozoic times, have been raised and settled and thrown about, sometimes resembling the making of a marble cake in a bake shop. The colors of veins and strips of sedimentary rock, of limestones, volcanics, shales and schists, varied from reds to purples, to pale greens and yellows, each telling a tale to our geologists of the

presence of transformed mineral elements, sometimes under fantastic pressures, as in the famous ophiolite strata, representing a documented series of upthrusts. These mountains are still rising, perhaps half a centimeter a year, at a rate representing the continuation of the impact of the southern continent, the Indian Plate or shield and its thrust into the underbelly of the Euro-Chinese land mass begun so many millions of years ago.

We crossed and recrossed the flanks of the Great Himalaya, sometimes over passes more than 17,000 ft. in altitude. The air was thin, but the desert climate and the soft sandy dust everywhere often made breathing difficult as well, and gave most of us bad colds or "flu" with bronchial complications. Several of the party became ill, including our Chinese colleagues, who are no more exempt from altitudinal effects than Westerners. Finally we came down through the gorges of the source rivers of the Ganges, the Arun Kosi particularly, into Nepal, all of this on a road from Lhasa to Kathmandu built by the Chinese in the early nineteen sixties. We thus were the first party of foreigners to traverse a road which did not exist, and was not dreamed of in the nineteen forties, the last time when foreigners were seen in Tibet.

I often thought of the friends who had traversed the caravan routes, the precursors of roads in the first half of the century, some like Brooke Dolan and Ernst Schäfer, working for the Academy. What would they think of Autonomous Tibet today? We saw little in the way of wildlife; no large animals, the largest being two eagles and a vulture, the Lammergeier. Small birds, mostly larks or finches abounded in the irrigated fields, and an occasional Tibetan hare, marmot, or mouse hare (*Ochotona*) would show itself. Wolves have just been ordered to be exterminated in China. We saw none, although botanist colleagues reported seeing a single wild sheep being chased by two sheep dogs (?), and some of the geologists described what might have been two common cranes. During ten days perhaps a dozen Barhead Geese were seen (very wild), and as many Ruddy Shelduck, as well as a few small parties of Gadwall, Tufted Pochard, a coot and three moorhens. Small pickings for such a vast sweep of land. Evidences of overgrazing were everywhere, and hillside erosion of peat and tundra cover was the rule. Small plants like *Sophora* were being gathered for fuel, the juniper twigs treked or trucked in from vast distances to the farmstead communes. A great deal of major pine, spruce (*Abies*), hemlock, birch and larch was being trucked in also to the major towns for firewood, not an auspicious omen for the forested gorge country of southeast Tibet now that motor transport is available. The extent of grazing, the lack of fodder, and the evident extreme poverty of the indigenous inhabitants, bodes ill for Tibet, occupied by a very considerable number of Chinese, or Han as they term themselves, both military forces as well as development and administrative cadres. There is an imbalance of population which has to be paid for, and recent press accounts in China itself speak of corrective measures being required for the amelioration of poverty and suffering in Tibet. Perhaps the country will become so uneconomic as a satrapy that some benefit will result before it is too late.

In the meantime, awareness of conservation seems only to be beginning as the people's needs for food and shelter in the marginal climate come first. Additionally, the banishing of religion, formerly a natural protection for wildlife, and the presence everywhere of air guns in the hands of wandering people on the roads, reminded me of similar lowland desert areas in the eastern Mediterranean, where all migrant birds, and local small mammals are fair game. Time alone is the great healer in such matters. If wildlife can survive the evolution of a cultural and conservation conscience over the next generation, perhaps there is still hope. Otherwise only the deserts will win out.

S. Dillon Ripley, biologist, ecologist, authority of birds in the Far East, educator and museum administrator, began his scientific career with zoological expeditions to New Guinea and Sumatra sponsored by the Academy of Natural Sciences of Philadelphia. Subsequently, he joined the Yale University faculty and directed the Peabody Museum of Natural History. Since 1964 he has served as Secretary of the Smithsonian Institution. A writer for Frontiers since 1938, Dr. Ripley has authored many books including: The Sacred Grave, Trail of the Money Bird, Search for the Spiny Babbler, Handbook of the Birds of India and Pakistan and Rails of the World. He has recently returned from a trip on behalf of the World Wildlife Fund and International Council for Bird Preservation to China and the Autonomous Region of Tibet.

APPENDIX

Within the last several years, the spelling of Chinese geographical place names has been changed. The new system is called "Pinyin". To quote the *Gazetteer of the People's Republic of China*, published by the United States Board on Geographic Names, Department of the Interior, July 1979: "Pinyin spellings are the official romanized forms of Chinese-language and minority-language names now used in the People's Republic of China (P.R.C.). At the present time, Pinyin spellings represent names rendered in one of four languages used in official P.R.C. cartography – Chinese, Mongolian, Tibetan and Uighur – or names composed of both Chinese elements and either Mongolian, Tibetan or Uighur elements. The P.R.C. cartographic authorities

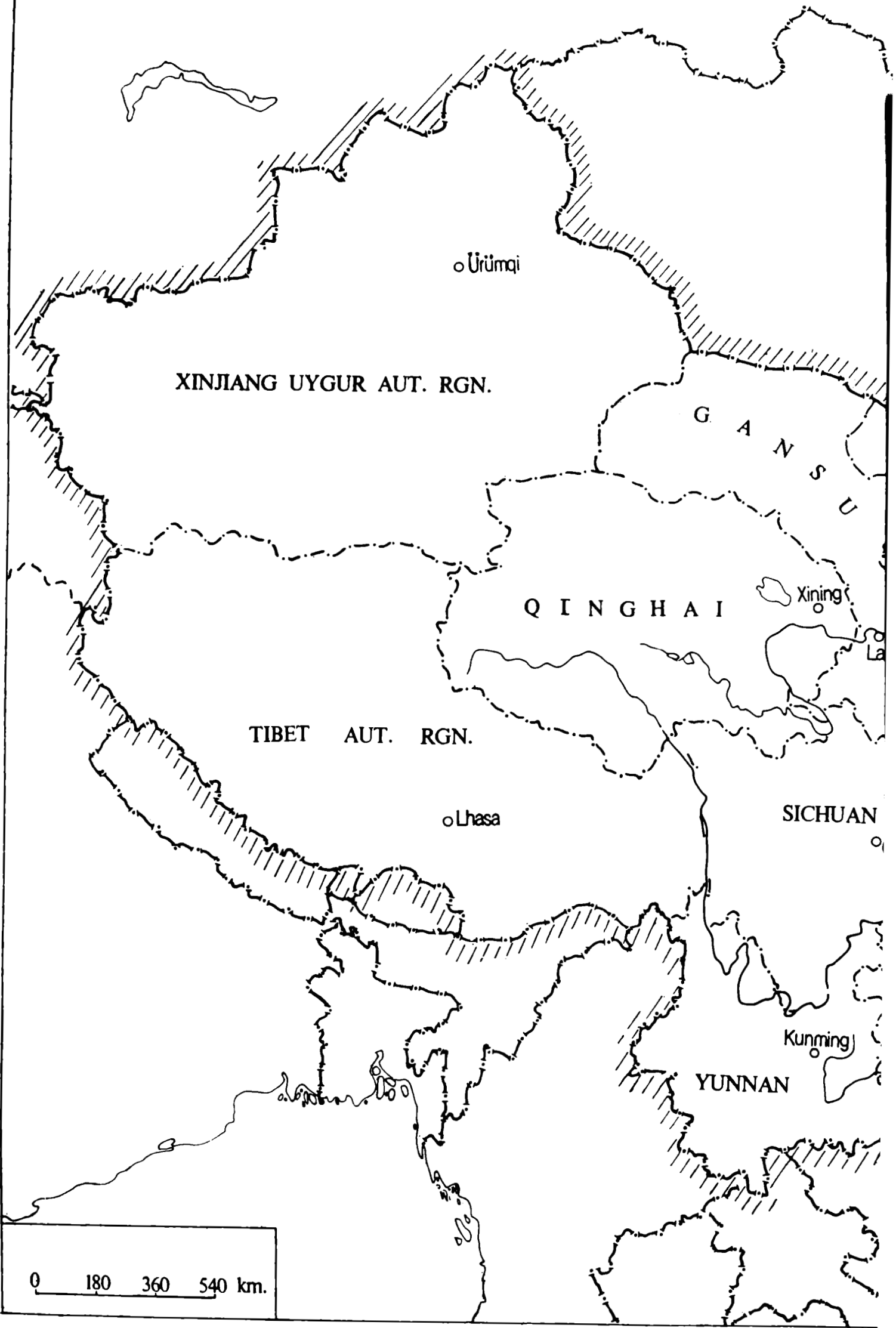
have stated their intention of rendering names in additional minority languages, but they have also stated that much work remains to be done before such names can be promulgated for official use throughout China."

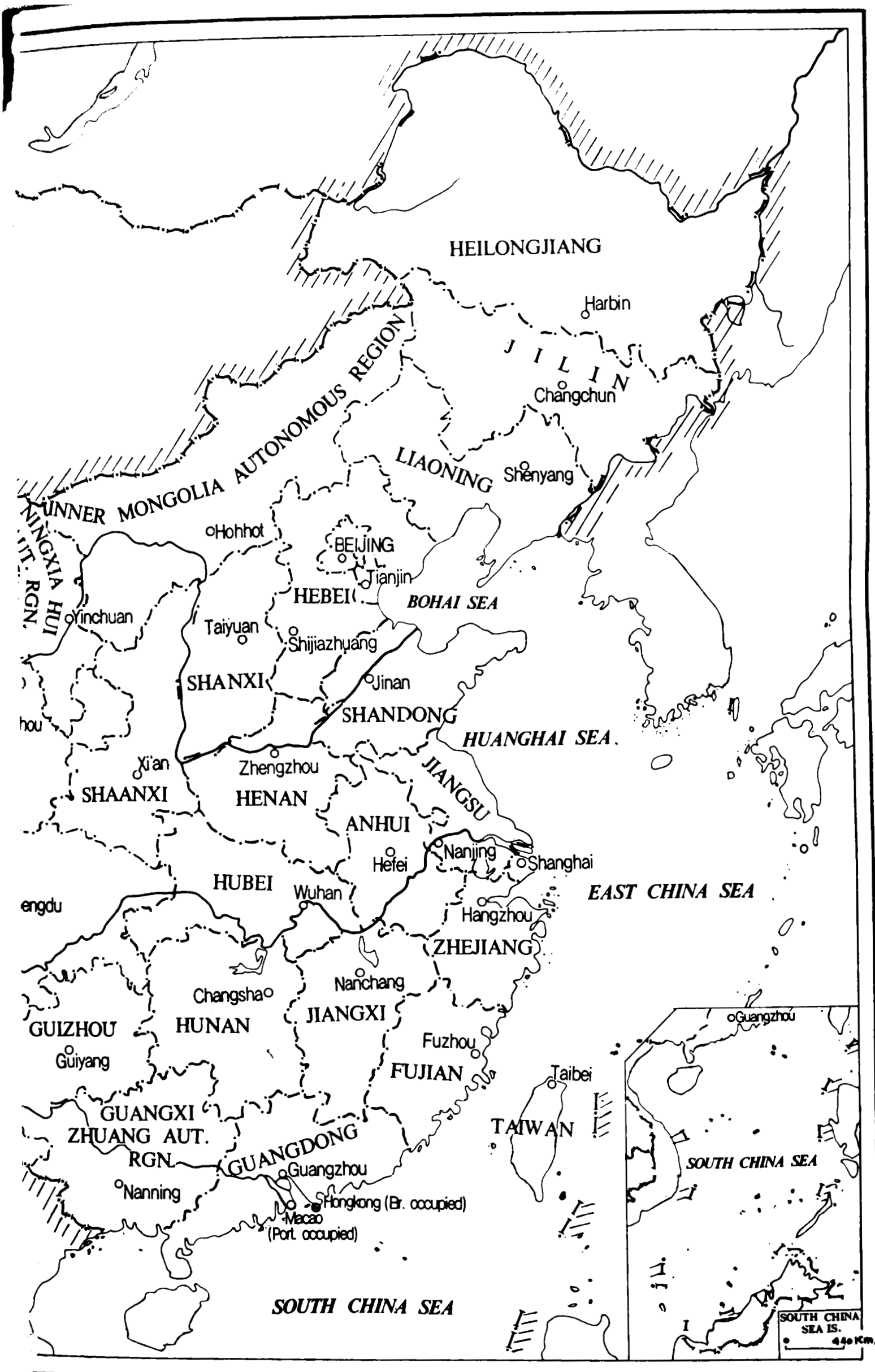
In Part I of this issue, the conventional spellings of Chinese and Tibetan place names (including towns, rivers, mountains, plains and valleys) have been retained as they are authentic for the years 1942 and 1943 in which Captain Brooke Dolan's expedition occurred. In Part II, the individual authors have each elected either conventional or Pinyin renderings, therefore, for the convenience of our readers, the following glossary is provided:

CONVENTIONAL	PINYIN	CONVENTIONAL	PINYIN
Amne Machin Mountains	<i>Anyemaqen Shan</i>	Mekong River	<i>Lancang Jiang</i>
Amoy	<i>Xiamen</i>	Minya Konka	<i>Gongga Shan</i>
Brahmaputra River	<i>Yarlung Zangbo Jiang</i>	Ningpo	<i>Ningbo</i>
Canton	<i>Quangzhou</i>	Peking	<i>Beijing</i>
Chamdo	<i>Qamdo</i>	Salween River	<i>Nu Jiang</i>
Chefoo	<i>Yantai</i>	Shansi Province	<i>Shanxi Sheng</i>
Chekiang	<i>Zhejiang</i>	Shantung Province	<i>Shandong Sheng</i>
Chengtu	<i>Chengdu</i>	Shensi Province	<i>Shaanxi Sheng</i>
Chinkiang	<i>Ching Chiang</i>	Shigatse	<i>Jihkatse</i>
Foochow	<i>Fuzhou</i>	Sinkiang	<i>Xinjiang</i>
Fukien Province	<i>Fujian Sheng</i>	Sining	<i>Hsining</i>
Gyantse	<i>Chiang-tzu</i>	Suchow	<i>Xuzhou</i>
Heilungkiang	<i>Heilonjiang</i>	Sungpan	<i>Songpan</i>
Hopeh Province	<i>Hebei Sheng</i>	Swatow	<i>Shantou</i>
Hupeh Province	<i>Hebei Sheng</i>	Szechwan Province	<i>Sichuan Sheng</i>
Jyekundo	<i>Yushu</i>	Takla Makan Desert	<i>Taklimakan Shamo</i>
Karakoram Pass	<i>Karakorum Shankou</i>	Tatienlu	<i>Kangding</i>
Kokonor	<i>Qinghai Hu</i>	Tibet	<i>Xizang</i>
Kwangtuang	<i>Quanfdong</i>	Tsinghai	<i>Qinghai</i>
Lhasa	<i>Lasa</i>	Tsingtao	<i>Qingdao</i>
Lop Nor	<i>Lop Nur</i>	Tsinling Mountains	<i>Qin Ling Shan</i>
Manasarowar Lake	<i>Mapam Yumco</i>	Yamdruk Lake	<i>Yamzho Yumco</i>
		Yangtse River	<i>Chang Jiang</i>

The Academy of Natural Sciences is a non-profit institution devoted to scientific research, education and exhibition. Membership benefits include free admission to the Natural History Museum, receipt of all membership publications, reduced rates for educational classes and expeditions, invitations to special programs and exhibit openings and Library Reading Room privileges. For further information call (215) 299-1022.

CHINA'S ADMINISTRATIVE DIVISIONS





Map of China – Courtesy of the People's Republic of China

