

such as *Ribes Giraldii* Jancz., *Lonicera heteroloba* Batal., and *Sorbus Koehneana* Schneider. At an elevation of 9,000 feet we find the thistle *Cirsium setosum* M. B., with lavender purple flowers along the stream, the bushy *Caryopteris tangutica* Max., endemic to Kan-su and Koko Nor, with a height of 1-2 feet, lavender flowers and greyish-wooly leaves, as well as *Anemone japonica* (Thunb.) S. & Z. var. *tomentosa* Max., with rich pale lavender flowers and large grey leaves of a silky texture. Among the rocks along the stream we encountered *Dracocephalum heterophyllum* Benth., known also from the Himalayas, and its congener *Dracocephalum imberbe* Bunge, first described from the Altai mountains with deep purplish blue flowers and leaves reddish purple beneath, *Bupleurum longeradiatum* Turcz., with small blackish-purple flowers and pale green leaves, and on meadows along the stream the orange-yellow flowered day lily *Hemerocallis Dumortieri* Morren, all at the 9,000 foot level. Higher up, but still along the stream bloomed *Hypericum* sp. (no 12772), *Achillea ptarmica* L., a European plant, *Anaphalis margaritacea* (L.) Benth. & Hook., *Erigeron acris* L., the rosaceous *Sanguisorbia canadensis* L., and *Rubus xanthocarpus* Bur. & Fr., bearing yellowish-red, edible berries, first described from Ssu-ch'uan. Of shrubs mention must be made of the yellow *Caragana frutex* K. Koch, 5-6 feet tall and two species of *Clematis*, *C. glauca* var. *abeloides* f. *phaeantha* Rehd., a climber over shrubs and *Clematis aethusifolia* Turcz., the former with purplish brown flowers.

This practically concludes the list of plants found on Lien-hua Shan; had time permitted, an intensified search of all the slopes and valleys at other seasons of the year would undoubtedly have brought forth many more species, but the mountain is also not high enough to develop a real alpine flora as is the case on the Min Shan. There is an absence of junipers; *Larix* is also wanting, although it occurs on the south and northeastern end of the Min Shan.

Lien-hua Shan with its varied flora is the last outpost in Kan-su, a rich oasis in a desert with which the meager flora of the Koko Nor region cannot be compared.

The approach to Lien-hua Shan from the south and again from the north is through arid loess country with a correspondingly poor flora, one would have thought that a mountain so close to the capital of a province, would have been botanically explored, yet its flora was less known than that of the remote Richthofen Range or Nan Shan, in the far northwest. As a whole, even taking into consideration the Kan-su min Shan, the flora of both Kan-su and Koko Nor cannot be mentioned in one breath with that of Hsi-k'ang and still less with that of Northwest Yün-nan, the richest of all China.

The Province of Ch'ing-hai

Present Extent

The province of Ch'ing-hai or Blue Sea, falls roughly between 90° and 103° E. Long., and 32° and 40° N. Lat. It is irregular in outline, much indented in the south and west, with a great part of it still unexplored. It is a high plateau whose mountains rise to over 20,000 feet, but in the northwest between 91° E. L., and 36-39 N. L., there is a great depression composed mostly of desert steppes and salt swamps known as the Tshai-dam (Tshwai-hdam), meaning salt swamp.

Three of the greatest rivers of Asia, as the Yangtze, Yellow River, and the Mekong have their sources in this province. The Salwin however originates in Tibet proper.

Prior to 1928 the province was smaller for part of its present, eastern territory, belonged then to Kan-su, the adjoining province, while a good part of its western region was reckoned to Tibet. With the exception of the changes in boundary to the east, those in the west are ill defined and marked more or less arbitrarily, for the Chinese did not control the territory.

The name by which the province is best known to the Western world is the Mongol one, Koko Nor, meaning Blue Lake of which the Chinese name is a translation; its Tibetan name is mTsho-sngon (Tsho-ngön = Lake blue), the adjective qualifying the noun follows it in the Tibetan syntax.

Historical Sketch

In ancient times the territory was known as the land of the Hsi Ch'iang 西羌 or western Ch'iang a large tribe related to the Tibetans, and later called the Ch'iang province. The Ch'iang were a nomadic people as the Chinese character for them testifies, it is composed of the radicals for sheep and man.

In the time of the Great Yü or Yü-kung 禹貢 period (tribute of Yü) B. C. 2205-2198 it was the land of the Hsi-jung 西戎 or western wild tribes. Prior to the Han dynasty B. C. 206-24 A. D., it became again the territory of the Hsi Ch'iang. After the Eastern Chin 東晉 317 A.D. it belonged to the T'u-yü-hun 吐谷渾, and in the early part of the T'ang dynasty, about 750 A. D., both the T'u-yü-hun and the Tang-hsiang 党項 or Tangut occupied the land, the former around the lake Koko (nor), and the latter the knee of the Yellow River. Later in the T'ang dynasty the T'u-fan 吐蕃, analogous to the Tangut, solely occupied the territory; they were all related to the present day Tibetans. The Tangut held sway till the advent of the Ming dynasty 1268-1644 A. D. after which the Mongol tribes, especially the Torgut Mongols, occupied the land up to 1616; at times (1512 A.D.) it was also under the sway of the Mongols of Ordos Tümed, who ruled more of the northern part, while the Tanguts were confined to the Yellow River area, from its source to within the knees, and east of it. In the beginning of the Ch'ing or Manchu dynasty it became the pasture land of both Mongols and Tibetans. It was then that the city of Hsi-ning 西寧, denoting Western Peace, was established, whose affairs were managed by a minister of state who governed the territory and the tribes.

In the 4th year of the Republic of China 1915, all this was changed and there was established the Kan-su border Ning-hai 寧海 protectorate; which included Ning-hsia 寧夏, and was guarded over by a Commissioner. It was then that the Mohammedans gained control of the territory and a Moslem general ruled ruthlessly over the Tibetans.

In the 17th year of the Republic, 1928, the province of Ch'ing-hai was created and parts of western Kan-su were incorporated into Ch'ing-hai.

Present Day Borders

In the north and east it borders on the province of Kan-su 甘肅, in the southeast it adjoins Ssu-ch'uan 四川, in the south Hsi-k'ang province 西康省 (Sikang), and in the south and west it is contiguous with Hsi-tsang 西藏 or Tibet. In the north it has a

common border with Hsin-chiang 新疆 (Sinkiang) or the New Frontier, the latter adjoins it also on the west and to the north of Tibet.

Its capital and trading centre is Hsi-ning situated in the northeast of the province. There are 29 Mongol banners and forty clans or tribes of Hsi-fan 西番 or western barbarians as the Chinese love to term non-Chinese tribes, who are ruled by local chiefs or T'u-ssu 土司. The trade mart is also the seat of the government of the province. The diameter from east to west is about 600 miles, and its length from north to south about 450 miles, its area approximately 228.350 square miles. Its inhabitants number roughly 15,112,000 souls.

Present Political Divisions

The province of Ch'ing-hai is divided into 19 districts or magistracies. Nearly all the old names current during the Ch'ing or Manchu dynasty have been changed when the borders of the province were rearranged. I shall give here both the old and new names of the towns or villages which have been raised to magistracies, as well as of those which had been magistracies before the changes took place.

Hsi-ning or «Eastern Peace», the Tibetan Zi-ling, and Sining of western maps has been made the capital, and its old name has been retained. It is situated on the south bank of the Huang-shui formerly called the Hsi ho 西河 or West River, also Hsi-ning Ho 西寧河. The ancient name of the town was Huang-chung 湟中.

Huang-yüan 湟源 is the present name of the former Tan-ka-erh 丹噶爾 derived from the Tibetan name of the place; it is situated on the Huang-shui 湟水 and is 30 miles west of Hsi-ning and formerly belonged to Kan-su.

West of Huang-yüan is the magistracy of Hai-yen 海晏 or the Quiet of the Sea. To the north of Hai-ning is the Hsien district of Hu-chu 互助 or Mutual Assistance, formerly a mere village called Wei-yüan-p'u 威遠堡. Northwest of the latter is Ta-t'ung-hsien 大通縣 whose former name was Mao-pai-sheng 毛伯勝, it was also known as Pai-t'a-ch'eng 白塔城 or the White Pagoda City. To the north of it is the district of Wei-yüan 甕源 or the Source of the Wei or Hao-wei 浩亶 or the Vast Wei River, actually the upper Ta-t'ung ho. The old name of Wei-yüan was Pei-ta-t'ung 北大通 a mere empty shell of a place.

The easternmost district is on the south bank of the Huang-shui or Hsi-ning River, and is called Min-ho 民和, it is opposite the village of Hsiang-t'ang 享堂 where the Ta-t'ung Ho 大通河 joins the Huang-shui or Hsi-ning River, actually one third of a mile before reaching Hsiang-t'ang. The Yamen (official residence) of the magistracy of Min-ho was first at Hsia-ch'uan-k'ou 下川口 («Below the Mouth of the Stream») but was later removed to the ancient Ku-shan-p'u 古鄯堡 or Ku-shan-yi 古鄯驛 or Ku-shan post station, which is southwest of Hsiang-t'ang, Shang-ch'uan-k'ou or Above the Mouth of the River, is directly opposite Hsiang-t'ang.

Southwest of Hsi-ning is the new district of Huang-chung 湟中 or the Centre of Huang, where the great yellow Lama temple sKu-hbum, pronounced Kumbum, meaning Hundred-thousand Images, the Chinese T'a-erh ssu 塔爾寺, is situated, and where Tsong-kha-pa, the founder of the Yellow Sect was born. Adjoining the lamasery is the small trading town or village of Lu-sha or Lu-sha-erh 魯沙爾, a transcription of the Tibetan Klu-gsar, pronounced Lu-sar. Between Hsi-ning and Min-ho is the district

town of Le(Lo-)tu 樂都 formerly known as Nien-pai 碾伯. South-southwest of it is the district of Hua-lung 化隆 the former Pa-yen 巴燕 or Pa-yen-jung 巴燕戎, more than halfway between the Hsi-ning River and Hsün-hua 循化, the seat of the Sa-lar Mohammedans. Southwest of the latter is the lamasery of Rong-wo, the Chinese Lung-wu ssu 隆務寺 created a hsien and called T'ung-jen 同仁. South of the Lake (Koko nor) is the district of Kung-ho 共和, and southwest of it the old hsien and city of Kuei-te, called Gus-mdo (Gü-mdo) in Tibetan, situated on the south bank of the Yellow River. Subject to it is the smaller hsien or district called T'ung-te 同德, actually only a lamasery called Ra-gya dgon-pa or La-chia ssu 拉加寺 on the Yellow River in the South. West of the Yellow River and almost opposite the brGyud-par (Gyü-par) Range is the long valley of Ta-ho-pa 大河湫, the Tibetan Hang Chhu or Hang River which flows into the Yellow River. The tiny group of huts located in the valley are also known as Ta-ho-pa or the Great River Bank or Plain. The Chinese with a look into the future, created of this wilderness a hsien or district called Hsing-hai 興海 or the Prosperous Sea; it is southwest of Kung-ho 共和. West of the Koko Nor is the little principate of Tu-lan ssu 都蘭寺 where there is a lamasery, it is called Dulan Hiid in Mongolian or the Warm Hermitage and marked on foreign (western) maps Dulan-kiit. It is also called Hsi-li-kou 希里溝, and is situated at the entrance to a narrow defile formed by the Dulan gol or Dulan River. Groves of *Juniperus tibetica* Kom., occur here. Near here is also a lake, the Dulan Nor or Tu-lan-hai on whose shore the local native prince had his camp. To the northwest is the small lake called Sirho nor, the Chinese Szu-erh hu 思爾湖 whence a trail leads to the salt swamps of Tsai-dam, from the Tibetan Tshwai-hdam, salt swamp, the Chinese Ch'ai-ta-mu 柴達木.

In the extreme central south is the district of Yü-shu 玉樹 or Jade Tree, whose ancient name was Chieh-ku 結古, called in Tibetan Khyer-dgun-mdo (Khyer-gün-do), also written sKye-rgu-dgon (Kye-gu gön) but the last is the name of the local monastery which controls the nomads of the region. The latter spelling of the name is according to Sir Basil Gould.¹⁶ The Tibetan name has been transcribed by the Chinese Kai-ku-to 蓋古多. It was also the last Mohammedan outpost where the troops of Ma Chi-fu¹⁷ had a fort and barracks. The altitude of the settlement is 12,928 feet according to George Pereira¹⁸ and comprises 200 Tibetan families and 40 Moslems. The town consists of mud-built houses on the hillside north, and above the Pa Chhu or Pa River 巴河 or Chieh-ku shui 結古水, a tributary of the upper Yangtze. Northwest of Yü-shu is the district of Ch'eng-to 稱多 situated on the upper Yangtze, the Chin-sha Chiang 金沙江 of the Chinese or River of Golden Sand, and the Tibetan hBri Chhu (Dri Chhu) or Cow-yak River.

¹⁶ Basil Gould, 1883-1956, diplomat, British trade agent and political officer in Tibet, Tibetologist.

¹⁷ Ma Ch'i 馬麒 (1866-1931?) was governor of Ch'ing-hai from 1929 to 1931. He is mentioned in Howard L. Boorman: *Biographical dictionary of Republican China*. Vol. 2. New York: Columbia Univ. Pr. 1970, 474b (in the biography of his son Ma Pu-fang 馬步芳 who became governor of Ch'ing-hai in 1938)

¹⁸ George Edward Pereira, 1865-1923, British explorer. See: *Peking to Lhasa*. The narrative of journeys in the Chinese Empire made by the late Brigadier-General George Pereira. London: Constable 1925. 293 pp.; H. Gordon Thompson: From Yunnan-Fu to Peking along the Tibetan and Mongolian borders, including the last journey of Brigadier-General George E. Pereira. *The Geographical Journal* 67.1927, 2-27; *Who's who in the Far East* 1906/7, 264.

The southernmost district is called Nang-ch'ien 囊謙 formerly known as Se-lu-ma 色魯馬, situated on the O-mu-ch'u Ho 鄂穆楚河, the Tibetan Ngam Chhu, which is the northeastern branch of the Mekong or rDza Chhu in Tibetan.

The northwestern and western parts of Ch'ing-hai are wild and uninhabited, and are mainly composed of salt swamps (Tshai-dam), barren mountains, waste lands, and snow clad ranges to the southwest.

The eastern part of the province is designated by the Tibetans as A-mdo and the region to the south of it Khams.

The Mountains of Ch'ing-hai

To give a detailed description of all the mountains and mountain ranges of the province is impossible as our knowledge of the area is insufficient and does not come within the scope of this account. Many of the ranges have been described by various travelers but the nomenclature is most confused. A detailed description is given in the accounts of the mountains explored by the author botanically, most of which were up to that time unexplored, as the eastern part of the Am-nye Ma-chhen, the Gyü-par Range, and the entire Min Shan 岷山 which belongs however to the neighboring province of Kan-su and not to Ch'ing-hai. The various ranges which comprise the Nan Shan in the extreme northwest have been visited by other travelers, notably Sir Aurel Stein¹⁹, but few or no botanical collections were made.

Other areas explored by the author, and previously unexplored, were the gorges of the Yellow River, the mountains east and west of Ra-gya, south to Tsan-gar (monastery), and east of the same to Dor-gen-nang.

Each of these areas is described in detail, also the country traversed between them and La-brang.

As to the rivers of the province, the Yangtze, which the Chinese designate as the Ch'ang Chiang 長江 or the Long River, has its source in the K'un-lun 崑崙 mountain range, that is its northwestern branch called the Ch'u-ma-erh ho 楚瑪爾河; the longest branch, with its source in the extreme southwest of the province is the Wu-lan-mu-lun Ho 烏蘭木倫河 which joins the Mu-lu-wu-su Ho 穆魯烏蘇河, the Muru Ussu of the Mongols; united they form the T'ung-t'ien Ho 通天河 which further south becomes the Chin-sha Chiang 金沙江 or River of the Golden Sand.

The Yellow River is described elsewhere in detail. Next of importance are the Ta-t'ung Ho 大通河 and Ya-lung Chiang 鴉龍江; the former rises on the northern slopes

¹⁹ Aurel Stein, 1862 – 1943, explorer of Central Asia; his important collections went to the Government of India and the British Museum. See Kazuo Enoki: Aurel Stein kei shôden. *Tôyô gakuhô* 1950:1, S.102-122; L. Rásonyi: *Stein Aurél és hagyatéka*. Budapest 1960 37 p. (Publicationes Bibliothecae Scientiarum Hungaricae 18); Publications of Sir Marc Aurel Stein. *Journal of the RAS* 1946, 86-89; C. E. A. W. Oldham: Sir Aurel Stein. *JRAS* 144, 81-86. *Aurel Stein on the Silk Road* / Susan Whitfield. London: British Museum Press, 2004. 143 pp. Among Stein's major publications are *Innermost Asia: Detailed Report of Explorations in Central Asia, Kan-Su and Eastern Iran / Carried out and described ... by Sir Aurel Stein*. With descriptive lists of antiquities by Sir Aurel Stein. Oxford: Clarendon Press 1928. 4 vols. 4° – *Serindia: detailed report of explorations in Central Asia and Westernmost China / Aurel Stein*. Oxford 1921. 4 vols. – *Ancient Khotan*. Detailed report of archaeolog. explorations in Chinese Turkestan. Oxford: Clarendon Press 1907. 2 vols.

of the Ta-t'ung Shan, one of the parallel ranges comprising the Nan Shan, and the latter in the district of Yü-shu 玉樹縣.

The sources of the Mekong are in the south central part of the province, that is the two branches which unite at Chhab-mdo (Cham-do), the Chinese Ch'ang-tu 昌都, to form the Mekong or Tsa-ch'u Ho 雜楚河 in Hsi-k'ang, and known in Yünnan as Lan-ts'ang Chiang 瀾滄江. The upper part of it is called by the Tibetans rDza Chhu (Dza Chhu), and in Yün-nan Zla Chhu, pronounced Da Chhu.

Products

The main products are sheep wool, musk, felts, hides, furs and yak tails which were formerly exported to Japan to augment the hairdress of Japanese women; salt is exported from the salt lakes in the west, fish (mostly a species of carp) from the streams and lakes, borax, medicinal herbs, and the following minerals: silver, iron, copper, lead, zinc, petroleum, and gold which is found in the region to the northeast in the district of Wei-yüan.

Communication

There are many trails and caravan routes, but none that deserves the name of road in the modern sense of the word. The distances are reckoned in Chinese *kung-li* 公里, three kung-li being equal to one mile. In Kan-su and Ch'ing-hai the Li is a little longer than the Ssu-ch'uan Li.

From Hsi-ning to Lan-chou the capital of Kan-su is 275 li; south to Kuei-te 104 li; west to Tu-lan-ssu 357 li, reckoned from Huang-yüan; to Ta-t'ung northwest 63 li, and thence 52 li to Wei-yüan in the north; to Hu-chu northeast 52 li, southwest to Yü-shu 795 li, to T'ung-jen from Hsün-hua 83 li, to Hsün-hua from Hsi-ning 155 li, from Hsi-ning to T'ao-chou Old City via La-brang 344 li. One trail leads from Min-ho to Yao-kai 窯街 thence Lien-ch'eng 連城 to Yung-teng 永登 and north to Wu-wei 武威, the former Liang-chou 涼州, to Chiu-ch'üan 酒泉, formerly Su-chou via Shan-tan 山丹 and Chang-yeh the former Kan-chou 甘州 a distance of 947 li; the stretch from Wu-wei to Chiu-ch'üan or Su-chou could be accomplished by mule cart. As the streams have no outlet and disappear underground, the countryside becomes in places a quagmire which is frozen in the winter, and in spring when the ice thaws, carts often sink into the quivering earth.

At the time of my visit only caravan trails existed, but now a sort of motor road has been constructed to the larger places, and also to the Koko Nor (Lake).

Population

The main inhabitants of Ch'ing-hai may be considered Tibetans and Mongols followed by Chinese, Moslems and T'u-jen or aborigines. The Chinese and Moslems dwell mainly in the northeastern part as in and around Hsi-ning and Huang-yüan. The Mongols are mostly confined to the northeastern Koko Nor plateau, while the Tibetans occupy the rest of the country. In this book appear many Tibetan tribal or clan names, this does not indicate that they are not Tibetans for all speak the Tibetan language, yet they are distinct clans and each has its own chief who rules over each respective clan. They are further divided into sedentary Tibetans who live in villages, and nomads or

hBrog-ba (Drog-wa) who occupy the grasslands. Each clan has its own winter and summer grazing lands, and they are nomads only to the extent that they shift their camps from one to the other, but never go farther afield. No clan would dare to move into the grazing lands of another. The encampments of lower altitude are reserved for winter occupancy, and those situated at higher levels for the summer camps.

No cultivation can be carried on on account of the height of these grasslands above sealevel, and the Drog-wa are thus dependent on traders who furnish them their tea and barley. These items are rarely if ever bought with silver, but given in exchange for sheep wool, the main product of the grasslands. Musk is a minor item, but hides furnish, next to wool, the most important article of export. The latter are usually brought into Hsi-ning or Huang-yüan and sold for cash.

The different Tibetan clans can be recognised by their dress, that of the men by their headdress, and that of the women by their ornaments worn on the back, on a long strip of cloth, suspended from their hair over the neck and back. These strips of cloth are of various colors, depending on the tribe, and so are the ornaments, either silver, amber, beads, coin, etc., and their arrangements on these strips.

The northwestern part of Ch'ing-hai is either waterless desert or salt swamp and not habitable, and so is the area adjoining it in the west, i.e., Tibet proper.

The Drog-wa live mainly on yak meat and mutton, buttered tea and Tsamba or roasted barley flour which is mixed with the buttered tea, kneaded with the hand into a dumpling and eaten. The Drog-wa will eat neither fowl nor fish, and no eggs. Potatoes or other vegetables are unknown and scorned. The only roots they eat are those of *Potentilla anserina* L., which they rob from the marmots who dig them, and store them for the winter in their burrows. One other item of vegetable is the fairy-ring mushrooms which spring up in the grasslands in the summer on darker green circular areas, but other vegetables they know not.

Sedentary Tibetans will often raise pigs and thus they have a more varied diet than the Drog-wa. Much butter, milk, and a sort of hard, dry cottage cheese are consumed; the latter is pressed dry, shaped into balls and left to dry near their stoves or on shelves around the tent, till they are brown from the smoke.

For fuel they use yak dung (argols) and sheep manure; the former is often gathered and stored for the winter by being arranged around their camps in the shape of a wall.

Distinct from the Tibetan nomad clans are the fierce mGo-log (Go-log), robber tribes, who live in the neighborhood of the Am-nye Ma-chhen, and south of the Yellow River. They are also divided into several clans who have each their own chiefs and tribal lands. That they are feared by all is needless to say. Large bands of them will raid the caravans on the highway between Hsi-ning and Lha-sa or rob neighboring encampments. They are jealous and superstitious and woe to the traveler who crosses their path, or enters their tribal lands.

Each clan will select a prominent peak or hill within its territory as the abode of its protective *sa-bdag* or lord of the earth, in other words mountain god, which each clan worships and makes offerings to each time a family partakes of tea; this is done by throwing out a ladle full of tea accompanied by quickly muttered prayers. Books could be written on Tibetan nomad clans, but this sketch will have to suffice.

One word must be said about the yak without which the nomad could not exist. The yak is everything, it furnishes milk and butter, meat which is cut up raw into long strips and hung up to dry in the wind and sun; its hide is used for shoes and pouches for bullets, tinder, etc., its horns for gun powder containers, its hair is twisted into ropes or woven into a coarse cloth out of which their tents are made; its dung furnishes fuel (argols), its tails are exported for fly wisps, and the living yak itself is used as a pack animal. Even the bones are found use for especially the shoulderblades, which when dry are inscribed with lamaistic prayers, tied one above the other to a yak hair rope and suspended in some conspicuous place where they will have to be moved, and in so doing the prayers are said for the party who hung them up. Or they will be collected and hung up after having been covered with prayers, under a specially constructed shelter outside some lamasery, hundreds of them, which are shaken, pile after pile, by pilgrims or worshippers after each completion of a pious tramp around the monastery, thus saying the prayers written on them.

As regards Moslems and their sects see population under Kan-su. They live mainly in suburbs of Chinese towns from Hsi-ning to as far south as Yü-shu. Mongols are also nomads, but unlike the Tibetans live in yurts constructed of sheep wool felt and are circular in outline. That they are much more comfortable than a Tibetan yak hair tent needs not to be emphasized. While Mongols will drink mare's milk no Tibetan will do so. Both Mongols and Tibetans are tall, well built and hardy, only the fittest survive in these high, windswept, inhospitable uplands.

The Region of the Koko Nor (Lake)

The name by which the lake is best known is the Mongolian one, namely koko – blue, nor – lake. In Tibetan it is called mTsho sngon-po (Tsho ngön-po) and in Chinese Ch'ing hai 青海, all meaning blue lake or blue sea.

As soon as one crosses the (pass) La-la ta-pan 拉拉達板, elevation 13,675 feet, west of Huang-yüan 皇源, the former Tan-ka-erh 丹噶爾, situated at 8,997 feet above sea level, one leaves behind paved streets, shops, temples, houses, and an agricultural population. A narrow ravine leads to the pass beyond which lies an altogether different world. To the west of the La-la ta-pan lie steppes, salt lakes without outlets, and salt swamps. Here are no villages and everywhere the eye looks there is grass even covering the rounded mountain ranges which encircle the basin in which this largest of Tibetan lakes is situated. The elevation of the lake is 10,700 feet above the sea.

Looking over the vast expanse of lake and steppe one has the impression that here is utter lifelessness, even the broad flat valleys are without a sign of a tree and lend their character to the surrounding mountains. Here silence seems to rule supreme, for man and beast seem to be non-existent. But this is in fact only a deception. The fierce nocturnal winds known as hei feng 黑風 or black wind, which sweep over the vast landscape do not permit the growth of bush or tree, and only grass or flat, rosette-forming plants, can flourish.

Looking south from the encircling ranges one beholds a veritable sea of mountains. In the north we have the parallel and interlocking ranges of the Nan Shan 南山 which

extend from northwest to southeast, and culminate at wide intervals in high, snow-capped peaks. South and east of the Koko Nor the mountains are rounded, their crests dome-shaped and grass-covered, they adjoin the arid plain interspersed with swampy areas, gravelly beds and sand which extend to the shores of the brakish lake; at their bases, especially in the east, huge sand dunes are met with, but what little shrubby vegetation there is, one finds only near the foot of these mountains. The lake itself, according to Filchner, has a surface of 5,500 sqkm, and according to Przewalski is between 200-230 miles in circumference.

I personally visited only the southern and eastern shores, so had no opportunity to ascertain its exact size. The water, not actually salty but brakish, is absolutely clear so that every pebble can be seen at the bottom. The deepest part of the lake is 60 feet near its southern end. About the centre of the lake is an island called by the Chinese Hai-hsin 海心 or the Heart of the (Sea) Lake, on which a small Tibetan shrine or temple has been erected, inhabited by ten monks (at the time of my visit). No boats or canoes are known, and the only time the monks can reach the outside world is in the winter when the lake is frozen, from November to March.

Many streams flow into the lake of which the principal one is the Pu-k'ò Ho 布喀河; the name is merely a Chinese transcription of the Mongol one, Bukhain-gol. It has two sources one north and near the western peak of the Ta-t'ung Shan 大通山, and another southeast of the Kara Nor or Black Lake. As the object of our exploration was a dendrological one we did not linger long in that vast grassy landscape, but visited its southern and eastern shores only. However the range east of the lake, known as the Potanin Range, proved of considerable botanical interest. It is at a notable distance from the lake, and its main valley extends from north to south, and is known as Ra-k'ò gorge.

The Region between Hsi-ning and Huang-yüan

Hsi-ning 西寧 meaning Western Peace, the capital of the province of Ch'ing-hai is situated on the right bank of the Huang-shui 湟水, formerly called Hsi Ho 西河, or West River, also known as Huang-yüan Ho 湟源河, after the town 30 miles west of Hsi-ning, the last outpost of Chinese civilisation east of the Koko Nor. Hsi-ning is at an elevation of 7,800 feet, the streets are planted with willow trees and poplars, the mountains surrounding the town are bare and the whole scenery dreary and dusty. The plants cultivated are mainly wheat, sorghum, millet, potatoes and maize, while in truck gardens the usual Chinese vegetables are grown. Hsi-ning is the center of the wool trade, wool being brought from all over the Koko nor by yak, and thence loaded on camels is sent to Pao-t'ou-ch'eng whence it used to be shipped by rail to T'ien-chin 天津 (Tientsin) and from there by boat to the United States.

Only 30 li or ten miles southwest of Hsi-ning is the famous Tibetan monastery of sKu-hbum (Kumbum) or 100,000 Images, called in Chinese T'a-erh ssu 塔爾寺, built on the spot where the founder of the Yellow Sect, Tsong-kha-pa was born. The lamasery has been fully described by Wilhelm Filchner in his book *Kumbum Dschamba Ling*,

Leipzig 1933.²⁰ Adjoining the monastery is the Moslem trading town with caravan inns, called Lu-sha-erh 魯沙爾.

The path to Huang-yüan leads through the west gate of Hsi-ning and the suburbs due west, up the valley of Huang-yüan River whose waters are usually crystal clear. The valley is quite broad and so is the road which mule carts, heavily loaded with wool, four mules to each cart, frequent. The wheels of the carts are huge and the rims are of heavy iron with sharp prongs at short intervals, giving them the appearance of a cogwheel. These wheels useful on muddy roads, are also their ruin, cutting deep trenches into them. Here and there the road is planted to both sides with poplars, *Populus Simonii* and *Populus balsamifera*, also willows which have spread over the broad valley, especially along the borders of fields. Next to the crops mentioned previously are oats, beans, the *Vicia Faba*, and *Cannabis sativa* the Indian hemp from which the farmers weave their thick, rough, hemp-cloth; it is woven in narrow strips and then sewn together. The hills surrounding the valley are absolutely bare with not a sign of a tree, except those planted on the plain. The fields are extensive and very fertile, they are irrigated by the waters of the Huang-yüan River and its affluents, and belong to various villages. About 35 Li from Hsi-ning the valley broadens considerably, the hills are high, but bare. On this stretch the stream receives two affluents one coming from the south, and where the valley is exceptionally broad, one from the north. To the south, in the distance is visible the high range called La-ya Shan 拉鴉山 which separates the Huang-yüan stream from the Yellow River; it is composed of mica-slate and black dolomite and is about 15,000 feet in height, covered with snow for the greater part of the year. Directly ahead, west, there is a very narrow gorge from which the Huang-yüan stream issues. A mile beyond there looms up an exceedingly rocky range about 17,000 feet in height which extends from south-southeast to north-northwest, also bare of trees and covered with snow for about 2,000 feet; it is the eastern end of the Nan Shan 南山.

At the village of Ma-lung 馬龍 the stream issues from a gorge with the hillsides bare and rocky, being composed of granite, mica-schist with loose boulders hanging from above ready to fall. Through this somber gorge a trail winds following the meandering clear stream, here full of rapids. In places villages are situated in the gorge, while on the steep slopes groves of poplars, as *Populus Simonii* and *P. balsamifera*, enliven the otherwise dreary landscape. After a little over eight miles, the length of this gorge, the valley broadens and the trail ascends a small ridge whence the city of Huang-yüan can be seen, situated on the north slopes of the valley.

Outside the city, which is surrounded by heavy walls, was a Mohammedan garrison, the soldiers all dressed in black wearing peculiar angular caps drawn together by a cord on the top, like a lady's handbag. All the roofs of the houses are flat and resemble those of the middle east.

²⁰ Wilhelm Filchner: *Kumbum Dschamba Ling. Das Kloster der hunderttausend Bilder Maitreyas*. Ein Ausschnitt aus Leben und Lehre des heutigen Lamaismus. Mit 208 Abbildungen aus Kunstdrucktafeln nach eigenen Aufnahmen, 412 Skizzen des Verfassers im Text, einer Lichtdruck- und einer Buntdrucktafel sowie einer Klosterkarte. Leipzig: F. A. Brockhaus in Komm. 1933. XVI, 555 S. With prefaces by Berthold Laufer and Ferdinand Lessing. A large part of the book was authored by W. A. Unkrig (1883-1956) who, as a paid collaborator, is mentioned in the preface but does not show up as co-author.

It is a typical frontier town, but dirty to a degree. The valley in which it is situated is completely surrounded by snow-covered mountains which in the west separate it from the Koko Nor steppes and lake. The town is really beautifully located at an elevation of 8,997 feet, the snow-covered ranges encircling it and the clear stream rushing down the valley into the gorge below adding greatly to the beauty of the scene.

From Huang-yüan Across the La-la ta-pan to the Koko Nor

Leaving Huang-yüan by the west gate the road leads over a hillock down into the valley planted with the species of poplars and willows already mentioned, which with *Ulmus pumila* furnish the only available wood for the construction of bridges and houses. One poplar log about seven to ten feet long and ten inches thick sold for seven taels silver or about five Dollars U.S.

An old bridge spans the Huang-yüan Ho, the trail leading across, continues west around wheat fields up an affluent called the La-la Ho 拉拉河 whose source is in a pass of that name which separates the Huang-yüan district from the Koko nor. The La-la valley is hemmed in by grass-covered bare hills, and is named after the La-la village situated on the right bank of the stream. The only tree growth is to be found in the lower part of La-la valley where poplars are cultivated. At a crossing of the stream to the right bank is a tiny hamlet, not constructed of houses, but dug out of the loess walls of the valley, the villagers being actual cave dwellers. It is named Shih-yai-t'u 石崖土 or the Rock Cliff Place, after a rocky precipice a little beyond the village. The rock is here coarse granite and mica. A few li beyond the valley branches, the left branch leading to Sha-ra-khu-thul, the Chinese Ha-la-k'u-t'u 哈拉庫圖, ruled by a local chief, and the right, directly west, leads up to a shallow pass and a small hamlet to the left, at the head of the valley. Instead of following this valley to its head the trail leads up another valley to the left to a small Buddhist temple called Ta-tsang ssu 大藏寺; the valley is a rather long one, and the altitude at the junction of the two is 10,350 feet.

Here the valley floor is one mass of *Iris tenuifolia* Pall., with the prevailing scrub vegetation consisting of *Berberis diaphana* Max., very conspicuous on account of its crimson autumn foliage, and bright red, oblong fruits, and *Potentilla fruticosa* L. var. *parvifolia* Wolf., a yellow flowered form, the latter the most common shrub in this valley. On the slopes around 11,000 feet elevation grows *Caragana jubata* (Pall.) Poir., with thick, fleshy stems red when young, but it also extends higher up the steep grassy valley slopes. The buckthorn *Hippophaë rhamnoides* L., here a small shrub only about 1 foot tall, covers the steep slopes, like a carpet, whereas along the streambed it forms tall bushes, and when growing isolated becomes a small tree. A species of *Swertia* with ultramarine blue flowers thrives with *Gentiana Futtereri* Diels & Gilg, but does not extend as high as the latter which ascends to 12,000 feet. *Leontopodium lineare* H.-M., and the umbelliferous *Pleurospermum cnidiifolium* Wolff., only 2 feet high, with green flowers, extend from 11,000 feet to below the pass. *Aconitum szechenyianum* Gáy, and *Delphinium tatsienense* Franch., the latter with large blue flowers and very long spurs, are met with in gravelly patches on the grass-covered slopes, and are associated with the yellow composite *Tanacetum tenuifolium* Jacq., 1 foot tall. Another species of gentian, *Gentiana siphonantha* Max., forms fairly large sized clumps on rocky, exposed slopes

with flowers of a purplish blue, while *Gentiana Futtereri* with rich blue flowers, striped yellowish, reminds of *Gentiana sino-ornata* of Yün-nan, mostly found in wet meadows. All the gentians seem to prefer the same type of situation for here occurs also *Gentiana straminea* Maxim., but instead of being prostrate grows over one foot in height, in long grass. In wet meadows at the head of the valley thrives *Saussurea stella* Max., forming flat rosettes with red leaves and reddish purple flower-heads. At 12,000 feet elevation and extending to near the very top of the pass 13,000 feet, grows *Saxifraga diversifolia* Wall. var. *Soulienana* Engl. & Irmsch., disporting yellow flowers.

Lower down at 9,500 feet occurs *Berberis Boschanii* Schneid., a shrub 3-4 feet tall with racemes bearing small red, transparent, elliptical fruits. It grows in thickets along the stream. This valley, as probably all others which extend east from La-la ta-pan were once forested with conifers as one lone tall *Picea asperata* Mast., indicated. The tree survived because of its great size and the difficulty of getting it out, once cut. On the grassy slopes at 9,500 feet a lovely species of *Gentianella* no 13347, not as yet identified, found a foothold also *Sorbus tianschanica* Rupr., further indicating spruce forest, on the outskirts of which it loves to grow; its brilliant red fruits make it conspicuous, but it does not reach its full height here, being only 5-6 feet tall. Here and there, scattered, occurs the very handsome *Lonicera syringantha* Max., which ascends to 10,000 feet. *Valeriana tangutica* Bat., with pale pink flowers adheres to the grassy exposed slopes at the same elevation. It is usually found in, or on the margins of spruce forests which the Chinese have now exterminated. A dragonhead *Dracocephalum heterophyllum* Benth., with creamy white, fragrant flowers keeps to the grassy exposed grades. This with a few willow bushes forms the plant growth near the head of this valley up to nearly 13,000 feet.

The summit of the pass is exactly 13,110 feet (hypsometer) and from it one can obtain a glimpse of one corner of the blue lake. The wind blows fiercely here from northwest, and freezing temperature occurs early in the autumn on La-la ta-pan as the pass is called. Ta-pan is the Chinese transcription of the Mongol word *daban*, in classical Mongolian *dabayan*, it is equivalent to the Tibetan *la* = pass of a mountain; this seems to be its principle meaning for the verb to pass or to cross over a mountain is *dabakhu* in Mongolian. Looking north from a peak to the right, still higher ones, with a few rock outcroppings form the continuation of the range which constitutes the divide between the Yellow River and the Koko Nor plateau whose rivers and lakes are without outlet. The otherwise rounded crest of the range is composed of grass-covered loess.

From the pass the trail descends into a broad valley flanked by bare hills, no shrub or bush, not even one foot high, grows here, all is bleak and dreary, short grass alone can endure the icy blasts which sweep over this region from the northwest. The valley floor on the other side of the range over which the trail leads in a westerly direction is 12,350 feet; looking northeast are light brown sand dunes extending into the actual Koko Lake, while a range, partly snow-covered, extends from south-southeast to north-northwest, behind which lies Chhab-cha, the Chinese Chia-pu-chia 恰布恰; it is the South Koko nor Range and seems not to be known by any specific name, it comes close to the southern lake shore, while the ranges to the north, east and west are considerably farther removed.

The vegetation along the shore mainly on sandy flats, as well as on the sand dunes at an elevation of 11,000 feet, is composed of the fleshy-leaved *Clematis tangutica* Korsh. var. *obtusiuscula* Rehd. & Wils., an erect shrub 2-3 feet in height; its fruiting heads are large, all of three inches in diameter, and a pinkish purple; on the drier rocky slopes near the foothills practically the only plant proved to be the chenopodiaceous shrub *Eurotia ceratoides* C. A. Meyer. On the sandy, wet grassy banks of the lake occurs the small, compact, rosette-forming *Potentilla bifurcata* L., often deformed by a gall insect; it is associated with *Aster Bowerii* Hemsl., with deep lavender flowers. Everywhere around the lake, at 10,700 feet flourishes *Gentiana dahurica* Fisch., with pale purplish blue flowers, and the prostrate rosette-forming thistle *Carduus euosmos* W. W. Sm. & Forr., its yellow flowerheads crowded in the centre. The Edelweiss *Leontopodium linearifolium* Hand.-Mazt., is partial to swampy areas near the sand dunes while *Pedicularis alaschanica* Max., *typica* Prain., is restricted to the meadows in the immediate vicinity of the lake where it disports its pretty yellow flowers in company with the rosette-forming purple legume *Oxytropis falcata* Bunge. Another thick prostrate rosette with deeply lobed leaves found here is *Saussurea Thoroldii* Hemsl., its small flowerheads packed into a dense purplish mass; it prefers the swamplier meadows near the shore.

Wherever swampy meadows occur there are to be found the above composites associated with *Cremanthodium lineare* Max., with single yellow flowerheads and the flat, dark red, lanceolate entire-leaved, rosette-forming *Saussurea stella* Max., its roots deeply embedded in the mud. *Stipa conferta* Poir., which grows in masses and forms tall clumps vies with *Iris tenuifolia* Pall., and *Phragmites communis* Trin., for space.

Low flying birds are plentiful in this region and many can be killed with a stick. We bagged about 20 specimens representing a number of species among them two vultures *Haliaëtus leucoryphus* (Pall.), and a new species of owl or rather owllet *Athene noctua imposta*, later again collected by us in the grasslands east of the Yellow River between Ra-gya and La-brang.

On this vast plateau one is in a different world, away from the densely populated region of China, here reigns peace and beauty, and I cannot do better than to quote from my diary while camping on the lake shore.

September

«The sunset was most beautiful this evening. The sky took on the magic coloring of sunsets one beholds in upper Egypt as at Luxor across the desert. The mountains were a royal purple, the sky a pale blue which merged into yellow and green, black fleecy clouds hung over a pale, lemon-colored sky which turned a golden yellow over the deep red mountains behind which the sun disappeared. The placid lake turned a creamy white, and cranes flew lazily to their nesting places. Not a soul was visible, only our tents stood out against the lake with wisps of smoke from our camp fires encircling them. Soon the mountains turned a cold bluish grey, the plain turned brown, and the lake a dark blue towards the east. Yet twilight lingered in the west, a pale orange sky merged into green and then abruptly into a dark starry firmament, while the west end of the lake still retained its pale blue color.

About 2 p.m. a terrific gale started to blow which whipped my tent hither and yon; fiercer and fiercer became the gale so notorious on these plains: I tightened the tent-ropes, and as my tent was nearest the lake I feared to be blown into its angry waters: snap went one pole, and calls for help against the fury of the gale, remained unanswered till at last they heard me and came to my assistance; had I released my hold upon the tent poles there would have been little left of the tent. Mohammedan and Tibetan travelers never use wall tents, the canvas of their tents slopes directly to the ground so as not to allow the wind a chance to play with it. The nomad tent, an ungainly affair, is fastened to thirteen poles all arranged outside the tent, with one large pole in the centre, giving the appearance of a huge black spider. The fury of the wind pitched the lake into a high running sea whose breakers dashed against the very walls of my tent like the surf over an island reef.»

The wind which the Koko nor nomads call Black Wind is much dreaded and for this reason they keep their encampments near the foothills and in the mouth of the shallow ravines. We broke camp at 5 a.m. and continued our way along the lake towards Tu-lan ssu 都蘭寺 where forest exists of *Juniperus zaidamensis* Kom.

The terrific winds encountered in the Koko nor and which usually start about 2 a.m. blow constantly throughout the year, hence the region is one of the bleakest imaginable.

The plain around the lake rises gradually to the foothills to an elevation of 10,825 feet, whence a number of small streams empty into the lake. The lake recedes here, due to a huge landmass extending towards it from the mountains and describes a big bay, with a narrow sandspit extending some distance into the lake. The only plants encountered here are *Stipa* and the ever present *Iris tenuifolia* Pall., with the thistles and the bushy *Clematis*.

Towards northeast extends a huge dry brown plain with the snow covered mountains in the distance, the whole aspect is limitless and monotonous, everything is bare and bleak.

Our camp at 11,210 feet was a sheltered one and we hoped for a peaceful night, yet we were awakened after midnight when our soldiers opened fire at robbers who had sneaked up to our tents to rob us. Their method is to crawl noiselessly to the tents, cut the ropes so that one is caught like in a bag, but the would-be robbers were driven off due to the alertness of our Moslem soldiers.

Along the southern and eastern lakeshore at some distance are small fresh water ponds separated by sandbars.

The ground is here covered with coarse gravel and sand, the glare hard on the eyes and the heat unbearable at midday; a real desert country with loose sand dunes and shrub vegetation of *Clematis tangutica* var. *obtusiuscula* Rehd. & Wils., and a new variety of *Juniperus chinensis* var. *arenaria* Wils., with spreading branches which forms shrubs 1 foot high on the dunes at an elevation of 11,000 feet.

Here I shot a huge eagle and two species of sea gulls *Larus brunicephalus* Jerd., and *Larus Ichthyaëtus* Pall., as well as the gray goose *Anser anser* L., and a few small birds. The same vegetation as described previously extends to the foothills of the Potanin Range with the addition of *Oxytropis aciphylla* Led., also known from Mongolia and the Altai mountains, *Artemisia salsoloides* Willd., with rich dark green leaves and *Potentilla fruticosa* var. *parvifolia* Wolf., a shrub 2 feet high. On the grassy plain which

seems endless occur huge raven, the *Corvus corax tibetanus* Hodgson, with long whiskers.

The Region East of the Koko Nor

Large sand dunes extend the whole length of the Potanin range which hems in the plain on the east. At the foot of the dunes are small, clear fresh water ponds, but the vegetation is extremely poor; here persist only thistles, Edelweiss, and *Stellera chamaejasme* L., with flowers purplish pink and white, this differing from the Yün-nan form which is yellow. The region here is most peculiar, exhibiting absolute desert conditions with high sand dunes adjoining fresh water ponds, then again dry grassy steppes joined by swamps with huge grassy hummocks, and beyond all that the brackish lake. Huge birds either eagles or vultures soar constantly at a great height over the plain, forever circling and on the lookout for dead yak or sheep.

The sand dunes were formerly the happy hunting ground of Tibetan bandits who waylaid travelers who, impeded by the sand, can only make slow progress, but Ma Chi-fu of Hsi-ning, with a ruthless hand exterminated them, chopping the heads off those who were not shot on the spot. In order to reach the Potanin Range, one must cross the dunes, a slow and laborious procedure as one sinks deeply into the sand, up and down at an elevation of 11,400 feet. *Artemisia salsoloides* Willd., a fleshy bush with divided leaves, and globose cushion-forming spiny *Oxytropis aciphylla* Led. are the only plants which find foothold on these dunes. The dunes give way to a grassy steppe, boggy in spots with large, grassy hummocks surrounded by standing waters. Huge lämmergeiers *Gypaëtus barbatus grandis* Starr., feeding on dead yak, and gazelles or antelopes, with a spread wings measuring ten feet from tip to tip, are common (see Plate 40).

A gap through the range leads into a broad grassy plain which from the pass looks lifeless, but is inhabited by Tibetan nomads. To the south of the range at the southeast end, a spur extends directly south which is known as the Balekun Range, while the one on the east flanking the Koko Nor is named the Potanin Range after the intrepid Russian traveler.²¹ By crossing the former range one comes to Balekun Gomi on the Yellow River west of Kuei-te 貴德, on the highway to Lha-sa. Directly east of the Balekun Mountains is the Chinese Jih-yüeh Shan 日月山 or The Sun and Moon Mountain, it is probably only an eastern extension of the Balekun mountain which derived its name from a little settlement to the south of it.

The lake is a deep and glorious blue and seems to merge with the horizon in the North. Here one meets with yaks loaded with wool, while sheep graze about the thousands. Every path leads to the lake over this vast expanse.

²¹ Grigorij Nikolaevič Potanin, 1835-1920, Russian explorer of Central Asia. See Grigorij Nikolaevič Potanin: *Vospominanija*. Novosibirsk: Zapadno-Sibirsk. Kn. Izd. 1983. 332 p.; Conclusion: 1986. 339 p.; Potanin: *Pišma*. 1-5. Irkutsk: Univ. 1987-1992; E. Bretschneider: *History*, 1007-1033. Potanin undertook four major research trips through China and Central Asia; his main works are *Očerki sěvero-zapadnoj Mongolii: rezul'taty putešestvija, ispolnennago v 1879 godu po poručeniju Imperatorskago Russkago Geografičeskago Obščestva*. S. Peterburg, 1881-83. 4 vols. and *Tangutsko-Tibetskaga okraina Kitaja i central'naja Mongolija: Putešestvie G. N. Potanina 1884-1886*; Izd. Imp. Russk. Geogr. Obščestva. S. Peterburg: Tip. A. S. Suvorina, 1893. 2 vols.

Close to the lake shore, back of low mounds which here surround the lake, are small fresh water ponds. Waterfowl of many different kinds are here at home as the teal *Anas crecca* L., *Casarca ferruginea* (Pall.), the cormorant *Phalacrocorax carbo sinensis* Shaw, the redshank *Totanus Totanus eurhinus* Oberh., *Actitis hypoleucos*, the stint *Pisobia temminckii* (Leisl.), and many other birds. Of grasses around the lake *Stipa splendens* Trin., and *Stipa conferta?* Poir. or perhaps a new species (13383) are the most important, while others are the new *Brachypodium durum* Keng, *Poa attenuata* Trin., with the var. *vivipara* Rendle, and *Poa alpina* L., of wide distribution.

The lakeshore is black with ducks and various other waterbirds specially the large black-necked crane *Megalornis nigricollis* (Przew.) which breeds here. For a botanist or dendrologist the Koko nor holds out little but grass, the ever present *Stipa* and the *Iris* (*Iris tenuifolia* Pall.) which takes control of land sporned by the grasses, it extends everywhere around the lake. The region to the east of the lake, but still west of the Potanin Range, is called Ketteniha, the Chinese K'ai-teng 凱登, also marked K'u-t'u-erh 庫圖爾 on some maps, but the former is correct.

The Vegetation of Râ-hu nang or Ra-k'o Gorge

The Tibetan encampment at K'ai-teng belongs to the Sha-khur clan. Their encampments are on a beautiful undulating plain which emerges from a grassy valley spreading fan-like with low hills to both sides, while ahead in the east, a mountain range extends from north to south called the La-rtse Ri in Tibetan, and La-chi Shan 拉脊山 in Chinese. The wide expanse gradually merges into a broad valley with a stream called the Ch'ung-k'o Ho 冲克河 which flows south to Huang-yüan. *Potentilla fruticosa* var. *veitchii* Bean, with white flowers, grows here in the streambed with willows. Beyond the stream the plain extends to the foot of the above mentioned mountain chain, part of the Potanin Range. A trail leads parallel to the mountain range and thence turns northeast following a dry ravine to a pass at 11,500 feet elevation. Here the rocks are mica, schist and quartz.

From the pass the trail descends into a broad plain with fine pastures, a more or less broad flat valley bordered by a bare mountain range some 14,000 feet in height. Directly opposite the pass which leads into the plain, is a small lake called Ulan Nor, which I could not find on any map. Large herds of Huang-yang 黃羊, by which the Chinese designate the fawn colored gazelles frequent these plains, being attracted by the fine pastures. Beyond the plain, another high pass, 11,800 feet must be crossed into a narrow rocky ravine which debouches into the Ra-k'o gorge, the Tibetan Ra-hu nang transcribed by the Chinese as La-k'o Ho 拉科河 and on the Ch. G. S. L. S. marked as La-ch'u-kuo-lo 拉楚果勒 of which the first two characters represent a transcription of the Tibetan, viz. La the name of the valley, chhu = stream, and the last two, kou-lo, a transcription of the Mongol, word for river = gol. Thus it is not really the name of either the valley or stream. Chinese maps made in Nanking or elsewhere in China and not at the source, are unreliable as to names, as well as location of streams, mountains etc.; vide the location of Hsi-ch'ing Shan, a mountain range, the name of which occurs in the more than 2000 year old Annals of Confucius, but which until this day is still misplaced on Chinese maps.

Ra-k'o Valley, at the time of our visit September – October was the encampment of both Mongols and Tibetans at an elevation of 11,000 feet, being sheltered from the cold winds sweeping the Koko Nor; Mongols however predominated. The first bushes encountered were those of *Potentilla fruticosa* L. var. *parvifolia* Wolf, with yellow flowers, *Berberis Boschanii* Schneid., and *B. dasystachya* Max. The forests were in the lower part of the ravine at an elevation of 10,000 feet. The vegetation is quite rich if not in species; at any rate it appears marvellous after a sojourn in the bleak wastes of the Koko Nor. *Picea asperata* with deep green glaucous needles is the prominent feature of the landscape; with it grows the new variety of birch *Betula japonica* var. *Rockii* Rehd., while on the outskirts of this forest thrived *Rhododendron Przewalskii* Max., and *Rhod. anthopogonoides* Max.; the former a shrub 4-5 feet, with thick, coriaceous, pale green leaves, bright yellow petioles with a fawn-colored indumentum on the underside, and whitish pink flowers, and the latter with very small bronze-colored aromatic leaves, and small white tubular flowers. These two species extend to the upper part of the Ra-k'o valley to an elevation of 11,000 feet and also into the lateral ravines which open into the Ra-k'o gorge proper.

The hillsides at our visit in the early autumn were a brilliant red from the *Berberis* bushes of which three species grow here, *B. Boschanii* Schn., *B. dasystachya* Max., and *B. diaphana* Max., all three being of about the same height, and golden from the foliage of the birches. *Cotoneaster tenuipes* Rehd. & Wils., a shrub 5-6 feet branching from the base, with black fruits prefers open rocky situation with full sunlight, and so does *Rosa bella* Rehd. & W., and *Rosa Swinzewowii* Koehne, the latter with large bladder-like fruits, and large oval, serrate leaflets, and the former with smooth, pyriform, scarlet fruits on long pedicels. *Sorbus tianschanica* Rupr., a small tree 5-20 feet, with brilliant red fruits in large cymes prefers the margins of the spruce forest, but occurs also singly on the hillside. The ever present buckthorn *Hippophaë rhamnoides* L., becomes here a tree on more exposed rocky situations, 15-20 feet in height with trunk of 1 foot in diameter. *Caragana brevifolia* Kom., forms spiny cushions on exposed rocky places near the upper margin of the otherwise bare slopes of the gorge, while below, it is a shrub 2-5 feet tall with suberect branches and minute leaflets, but always confined to dry situations. On the grassy hillsides flourish the fleshy *Caragana jubata* Poir., with rose-colored flowers, and along the streambed the lovely, fragrant *Lonicera syringantha* Max., reaching 5 feet in height, with scarlet subsessile fruits crowned by the calycine lobes. Herbaceous plants were at this season very few and were neither in flower nor in fruit except a species of *Gentianella* no 13662 as yet not identified; it had blue flowers and was less than an inch in height, occurring only at the higher elevation on the grassy slopes at an altitude of 11,000 feet. *Sorbus Koehneana* Schn., a much branched shrub 4-5 feet tall, with small leaflets and small pure white fruits in large clusters, accompanied its larger confrere.

Further down the gorge the forest becomes denser, and willows appear along the streambed. Birds are plentiful especially near the streambed in which the Ra-k'o River roars, over large boulders, a regular mountain torrent. The gorge narrows and the vegetation becomes still denser till it abruptly debouches into a broad bare valley, on the left slope of which is situated the lamasery Ra-hu dgon-pa or La-k'o ssu, while to both

sides of the stream wheat is cultivated. Ravines debouch into the now broad Ra-k'ò valley, and these are covered with *Berberis* and birches already enumerated.

The Forests of Kuo-mang ssu 過忙寺

The Huang-yüan valley is enclosed in the north by the Hua-shih Shan 花石山 over which a pass leads to the wooded valley of La-sa kou 拉薩溝 to where it widens at 8,650 feet at the village of La-sa.

The valleys and spurs which are interjacent between Huang-yüan and the lamasery of Kuo-mang ssu are all bare except the valley of La-sa kou which harbours a similar vegetation as Ra-k'ò gorge. In the east are low hills which extend from north to south seeming to block the La-sa valley which empties its waters into the Ra-k'ò gorge or here better called valley. The valley floor at the junction is 8,300 feet above sea-level. From a pass looking directly north a bare rocky mountain which I judged to be 11,000 feet in height, is visible and to the southwest a long snow range about 15,000 feet or higher separating the Hsi-ning 西寧 from the Yellow River valley; this is the Jih-yüeh Shan 日月山 or Sun and Moon Mountain of which a prolongation westwards is known as the Balekun Range.

From another pass 9,650 feet over the grass-covered loess which forms the eastern wall of the Ch'uan-lin valley a wonderful bird's-eye-view unfolds over the Pei-ch'uan ta-ho 北川大河 or the Great River of Pei-ch'uan (the North Stream) which flows from northwest to southeast past Mao-pai-sheng 毛伯勝 and enters the Hsi-ning Ho or Hsi-ning River just below Hsi-ning. Spur after spur follows intervening ravines, all are bare and grass-covered, the country being here cut up by a maze of valleys until the south gate or nan-men 南門 of Hsin-ch'eng 新城 or New City, at an elevation of 8,250 feet, is reached. A wall extends here over the hills and across the road, which is part of a southern branch of the Great Wall of China or Wan-li-ch'eng 萬里城 or the 10,000 Li Wall. The road leads to Mao-pai-sheng up the Pei-ch'uan ta-ho, the river flowing southeast. Here again limestone mountains have been pushed through the bed of schist and shale; the most interesting is Lao-yeh Shan 老爺山 crowned by a temple (Kuan-ti Miao 關帝廟), with its slopes wooded. Wherever temples are found on mountains, there the original vegetation has survived as the people are prohibited from cutting trees, etc.

This mountain is covered with a dense scrub vegetation composed of *Berberis verna* Schn., and a new variety of *Rhamnus leptophylla* Schn. var. *scabrella* Rehd. var. nov., *Clematis brevicaudata* DC., which climbs over the *Berberis* bushes, *Cotoneaster*, willows, poplars, *Betula japonica* var. *szechuanica* Schn., and here and there a *Picea asperata* Mast. The temple is 1,500 feet above the valley floor, making the summit 10,900 feet in height. The ascent is fairly steep being a good hour's climb, the temple taking all available space on the top, leaving only a narrow path around it on the edge of the vertical walls which extend into the Pei-ch'uan ta-ho. A wonderful view is to be had from the summit; snow ranges surround the region on all sides, the great Nan Shan 南山 or South Mountains dwindle towards the east where they seem to merge with the Hsi-ning - Huang-ho divide; to the west is the snow range which encircles the Koko

Nor, while opposite Lao-yeh Shan, considered male, is his wife, another limestone mountain but whose name I could not learn; Chinese love to personify their mountains.

The Pei-ch'uan ta-ho receives here an affluent called the Hsien-min Ho 先民河 whose broad valley is planted with poplars (*Populus Simonii* Car.), while *Iris tenuifolia* Pall., is plentiful along the road and on the lower hillsides. A white Chorten (mchhod-rten), or reliquary shrine off the road indicates a lamasery in the vicinity. Kuo-mang ssu lies nestled in this valley inhabited by an aboriginal population known as T'u-jen 土人, against the hillside. The entire valley floor is here covered with *Iris tenuifolia* Pall., and *Iris ensata* Thunb., both low growing species. *Picea asperata* Mast., is a very variable species both in growth, color of foliage, and size and shape of cones, and undoubtedly could be split into two or more species or varieties. That the entire region was once densely forested there can be no doubt; the disappearance of the forests can only be ascribed to the Chinese, for the Tibetans in these regions do not burn wood but use either yak argols or sheep dung as fuel.

Kuo-mang ssu 邇忙寺 is called in Tibetan by several names as bKra-shis sgo-mang dgon-pa; gSer-khog dgon-pa, and gSer-khog sgo-mang sgar-dang chos-bzang dgon-pa, pronounced Ser-khog go-mang gar-dang chö-zang gom-pa; it is famous on account of a lama who lived there known as the sMin-grol no-ma-han or the No-ma-han of the Min-drö-ling (Monastery), he was called Gong-mai lung-gis btsan-po or plain lama Tsan-po Gong-ma lung-gi i.e. of the superior instruction. He composed in 1820 the famous Tibetan geography of the world known as hDzam-gling-rgyas-bshad pronounced Dzam-ling gye-she.

Kuo-mang ssu is situated in a valley northeast of Huang-yüan, not far from the latter, and adjacent to Ra-k'o gorge but east of the Potanin Range. It is to the credit of the lamas of this monastery that the forests which cover the mountains opposite, facing north, have been left undisturbed. From almost the valley floor to the very summit of the range, a single species of spruce, *Picea asperata* Mast., forms pure stands. It seems to be the only conifer, except *Juniperus* of which several species occur, able to withstand the cold winters of this region. It extends north to the Nan Shan, west to the gorges of the Yellow River, and wherever it grows, its trunks rise from a deep carpet of moss. Once this moss is disturbed the trees succumb. It occupies northern mountain slopes where the snow lies for a long period, and the moss acts as sponge and holds moisture. The slopes facing south are either bare of trees and grass-covered or foster juniper forests. These have been depelted for the wood is used as incense by the Tibetans, trees are mutilated and deprived of their branches which are burned green, producing a white smoke, a pleasing offering to the Tibetan mountain gods.

The flora of this mountain is not rich and as the time of the year was advanced there were no herbaceous plants in flower, not even a gentian. The undershrub consists mainly of two species of *Berberis*, namely *Berberis kansuensis* Schn., a shrub 15 feet tall with long whip-like branches, large red fruits often only pale red, and oblong leaves, and *Berberis dasystachya* Max., which grows near and on the top of the mountain in clearings. This has orbicular leaves, but otherwise resembles its associate. *B. kansuensis* extends lower than its confrere and is more common at 9,800 feet elevation but it does extend up 10,300 feet. It is associated with *Lonicera nervosa* Max., a shrub 3-4 ft in

height with black fruits, and the low growing 1 ft tall, large leaved *Rubus Przewalskii* Ilj., deeply embedded in moss. Its fruit are red and sweet.

The most conspicuous deciduous shrubs or small trees are *Sorbus tianschanica* Rupr., reaching a height of 15 feet, with large cymes of brilliant red fruits, and *Sorbus Koehneana* Schneid., 12-15 ft. in height and white fruits, both grow in moss forest up to the summit of the mountain 10,300 feet elevation. Another *Sorbus* as yet not named grew on the summit ridge only, it was 20 ft. tall, had ascending branches and pink fruits (no 13284). Lower in the Picea forest prevails *Rosa bella* Rehd. & Wils., a shrub 4 ft tall with red glabrous fruits on hirsute pedicels; *Cotoneaster acutifolius* Turcz., 6-10 ft tall with black fruits, and *Cotoneaster multiflorus* Bunge 5-6 ft tall with red fruits grow all in the mossy forest, while in clearings and less dense situations occurs *Euonymus Przewalskii* Max., with pinkish-red, pendant fruits; it is associated with willows and the yellow flowered *Potentilla fruticosa* L., *Leontopodium haplophyloides* H.-M. a plant 1-2 ft tall, and partial to the grassy slopes on the outskirts of the forest at 9,500 ft elevation. No Delphiniums nor Gentians could be found, the altitude being too low and there was also too much shade for such species to flourish. The forest faces north, the opposite side is practically bare save for a row of *Picea asperata* on the spur and to the rear of the monastery. Back of the monastery proper as well as along the stream in the valley *Populus Simonii* Carr., and *P. balsamifera* were cultivated, otherwise the loess hills were bare and grass-covered. The Picea trees reached a height of 80 feet, some perhaps 100 ft., one stump one and a half feet in diameter had 119 rings. One single Aconite and a *Paeonia* were observed but they were neither in flower nor in fruit.

Looking east from the summit, and back of it, is a deep valley densely forested and so is the range further east. In the distance could be seen a rocky range with sloping alpine meadows, then snow-covered.

As a whole the region is botanically poor and in fact becomes poorer until the Nan Shan is reached, the system of mountain ranges which face the plains of Kan-chou 甘州 and the Gobi desert. The Nan Shan is however only forested on the southern slopes up to an elevation of 12,000 feet which is the actual timberline. Forests can here exist in protected valleys and on mountain slopes not exposed to the dry winds of the Gobi.

The Region Between Kuo-mang ssu and O-po 俄博

The region between Kuo-mang ssu and O-po is composed of valleys flanked on the west by the Ta-pan Shan 大板山 which extends from northwest to southwest hemming in the Ta-t'ung Ho 大通河, and on the east by the Liang-chou Nan Shan, both extending parallel; the latter range is what Farrer terms the Ta-t'ung alps, a misnomer, for the Ta-t'ung Shan is far to the northwest and separated by the broad valley in which the Hao-wei River, i.e. the upper Ta-t'ung ho flows. The valley floors instead of being grass-covered are one solid mass of *Iris tenuifolia* Pall., mixed with *Iris ensata* Thunb., but cultivation is carried on, wheat being the principle crop next to *Cannabis sativa* L., from which the natives (Chinese) weave their hemp clothing; beans, peas, potatoes, oats, and mustard are also grown. *Populus Simonii* Carr., and *P. balsamifera* are cultivated in large enclosed plots in the valley, evidently belonging to the lamasery. The mountains

are bare only the lower slopes of the valleys are covered with brush of *Potentilla fruticosa* L., *Berberis*, *Lonicera syringantha* Max., and willows, the latter being confined to near the streambed.

The valleys are literally alive with stone pheasants which no one seems to catch or shoot, shotguns are unknown and rifle bullets too expensive to waste on pheasants. Moslems usually hunt them with falcons as they can never eat a bird that has been shot dead, they must cut its throat before life has become extinct. Various hamlets are located in the valleys, the population being half Chinese half Tibetan. Certain villages are inhabited by T'u-jen or aborigines, similar to those found in the valley of Kuo-mang ssu. The women wear large trousers of blue cotton stuck into large, high boots which reach to the knees; for a jacket they wear red Tibetan *p'u-lu* or woolen cloth with sleeves of the same material. The abdomen is protected by a sort of shield which reaches from the waist to below the breasts, made of stiff red cloth, probably of several thicknesses, which is often embroidered. Necklaces of coral and other beads are worn around the neck and from the earlobes are suspended huge earrings three inches in diameter. Over all this they wear one long garment of blue cloth with a red border. On their head they wear a peculiar hat or cap in shape like that of an American sailor, it is made of yak hair or sheep wool felt. Two braids, one on each side, hang over the temples and ears to below the shoulders. The Chinese women of this region wear their hair in an oblong knob at right angles to the back of their head giving them a most peculiar appearance. That they are all but clean needs hardly to be stressed.

Beyond the villages Mongol and Tibetan nomads are encountered, the former using felt yurts circular in outline, while the latter use black yak hair tents, with their numerous poles as previously described, usually thirteen in number, arranged outside, around the tent to which the latter is tied. The Yak hair cloth being coarse, the tents leak the first ten years, but as the smoke and soot eventually closes the coarse meshes, they become waterproof thereafter.

The vegetation in the valley which leads to a pass over the Ta-pan Shan 大板山 is mainly composed of the brilliant red *Berberis diaphana* Max., *Berberis Boschanii* Schn., and *Berberis verna* Schn., but no trees are visible. This pass used to be the happy hunting ground of Tibetan robbers but the stern rule of General Ma Chi-fu had cleared them out.

There are three approaches to the Ta-pan Shan, the best and easiest is the one from Kuo-mang ssu, and is known as the Hsia-ta-pan 下大板 or Lower Pass. The second is by Mao-pai-sheng 毛伯勝 which is very steep and rocky, and difficult to negotiate with loaded animals; the third is by a valley below Kuo-mang ssu. The rock outcroppings on the pass are blue slate and brown sandstone.

The vegetation on the Hsia-ta-pan is composed of the stiff *Caragana jubata* Poir., willows, *Potentilla fruticosa* var. *parvifolia* Wolf., the yellow flowered variety, while on the wet northeastern slopes grew three species of *Rhododendron*, viz. *Rhododendron Przewalskii* Max., *Rhod. thymifolium* Max., and *Rhod. anthopogonoides* Max., they occur only on the northeastern slope where the snow does not melt until summer, the prevailing winds being here from the northwest and west. The first *Rhododendron* was observed at 11,000 feet, but extended up to 12,400 feet elevation. This was the

northernmost region where Rhododendrons were encountered. They were all shrubs 3-4 feet in height and formed dense clumps.

On the slopes of the pass 12,450 feet grow the large flowered *Delphinium Souliei* Franch., probably the northern limit of that species, and a *Meconopsis* such as I had not seen elsewhere. I surmised it to be a blue-flowered one. It was not higher than 10 inches, had 10-15 stalks rising from one rootstock, each stalk bearing one capsule at the apex, capsule and stalk being spiny, the latter down to the base. Seeds were collected under no 13306 but I never learnt where the seed was planted or what became of the plants which resulted from it. Other plants found on the summit pass are a species of *Saussurea* (no 13700), *Aconitum szechuanicum* Gáy, and *Gentiana Futtereri* Diels, closely related to *Gentiana sino-ornata* Balf. f. As the season was too advanced, herbaceous plants had mostly been killed by the severe frosts, except the plants mentioned. The northeastern slopes of the pass were covered with snow, and when returning on November 14th over a month later, the entire mountain was deep in snow. Below flows the Ta-t'ung Ho 大通河 from north-northwest to south-southwest; a high bleak range forms the northeastern valley wall with large areas indicating vast snow fields; in the north the range seems to dwindle and emerges into the plain.

The valley floor of the Ta-t'ung Ho, is covered with *Iris ensata* Thunb., and *Iris tenuifolia* Pall., almost to the exclusion of everything else. Further up the valley the Iris gives way to cultivation, wheat being the only crop, the whole valley over one mile in width was one vast wheat field to beyond the walled town of Pei-ta-t'ung 北大通 whose name has since been changed to Wei-yüan Hsien 豐源縣, situated at an elevation of 9,600 feet. Several villages are located on the eastern bank of the river but more on the sloping plain towards the foot of the mountain. The immediate hills bordering the Ta-t'ung ho which meanders here at 9,100 feet in numerous branches in rocky beds, are composed of red sand stone with superimposed loess of considerable thickness.

In the distance, north, are visible the walls of Pei-ta-t'ung or Wei-yüan. Here the stream flows in many channels interspersed with islands which are covered with grass and *Myricaria dahurica* (Willd.) Ehrb., bushes and a few thistles as *Carduus euosmos* W. W. Sm. & Farr.; in the stream bed among gravel grows *Saussurea cana* var. *angustifolia* Ledeb., with rich pink flowers, and on dry gravelly slopes along the banks *Eurotia ceratoides* C. A. Mey., with *Hippophaë rhamnoides* L., also willows and *Berberis*.

There are six distinct branches to this river, only one of which was two feet deep; in the summer when the river is swollen, inflated skin rafts are used to set men and loads across, while animals have to swim. The banks of the stream are conglomerate.

Higher up the valley coming from the northwest a valley and stream debouches into the main valley, flanked by a high snow covered range. The stream, actually a roaring torrent, is the real Ta-t'ung Ho, but which the Chinese mark as the Hao-wei Ho on their maps, denoting the stream below Pei-ta-t'ung as the Ta-t'ung Ho. The range hemming in the river on the south is the Ta-t'ung Shan Shan-mo 大通山山脈, shan-mo meaning mountain system. By this lateral valley leads a trail to a place called Yung-an 永安 or Eternal Peace. Above the confluence of the two streams, the valley with its brook, for the word stream is no more applicable, the greater volume of water having been

supplied by the main Ta-t'ung ho, is called Pai-shui Ho or the White-Water River, it flows in a bed of black sand and is not marked on any map. The elevation where the Ta-t'ung Ho enters the main valley is 9,875 feet, it issues from west-northwest.

Somewhat to the north Tibetan and Mongol nomad tents dotted the ever inclining plain. The Mongols denote the range which hems in the valley on the east as Donkhyr in Mongolian, and the high snow peak directly north Konkhyr, the latter Erich Teichmann²² denied as existing. Weeks later we crossed a pass to the west of it. It is a formidable mountain which I estimated to be 20,000 feet in height. It is correctly located on Bretschneider's map of China²³, which in many other respects is unreliable and out of date. The mountain is also marked but not named, on Sir Aurel Stein's map Kan-chou, Serial no 46, Survey of India no 98, its height is given as 17,200 by a Clinometer reckoning. Teichmann states «such names are unknown to the people of this region». It must be realized that four languages are spoken here, Mongol, Tibetan, Chinese and Turki, the latter by the Moslems. My Moslem escort who knew the region well, immediately when asked the name of the mountain said Konkhyr. In Chinese it is transcribed Kang-ka-erh 剛噶爾.

The Pai-shui Ho flows at the foot of the western hills at an elevation of 10,350 feet debouching into the Ta-t'ung Ho. From here on the valley narrows, and grassy low hills extend westwards into the plain. Flocks of little partridges *Perdix Hodgsonii sifanica* Przew., called Karachi by the local people, enlivened the plain, while cranes (*Megalornis nigricollis* Przew.) fed in the remnant of a lake, which the Chinese call Kan-hai-tzu 乾海子 or Dry Lake, and huge eagles and vultures of enormous size circle at terrific heights over the landscape. The plain is here one vast sea of mole hills and holes, made by the hamsters *Cricetulus lama* and the short-tailed hamster *Cricetulus alticola* or related species, which make riding very difficult. The height of the spur is 10,820 feet and the valley floor one succession of low grassy hills, not a rock being visible anywhere. The plain rises to an elevation of 11,500 above sealevel, the mountains to west diminish in height and are without snow. From the pass a trail leads into a dry streambed which has its source in the mountains immediately to the east, and which extends southwest joining other streams coming from the northwest. Many Tibetan nomads are encamped here with their thousands of sheep and yak. Beyond, another pass 11,350 feet elevation, leads into a ravine with a stream called the Liu-huang Ho 硫黃河 or Sulphur River where Moslems wash gold in a very primitive manner; a village called Sha-chin-ch'eng 沙金城 or the Gold Sand City is situated on the east valley slopes of the Liu-huang Ho, apparently the stream is rich in gold.

The trail turns up a lateral valley northwest, the streambed is rocky and flows through a defile composed of schist and quartz, it is a lonely valley; the hills are bare but rock outcroppings of sandstone stand like sentinels all along the hillside guarding the bleak scenery. There are strata of yellow, red, white and grey loams adjoining each

²² Eric Teichman (originally Erik Teichmann), 1884-1944, British diplomat and Orientalist. See his *Travels of a consular officer in Eastern Tibet: Together with a history of the relations between China, Tibet and India* / Eric Teichman. Cambridge: University Press, 1922. XXII, 248 pp. – *Journey to Turkistan* / Eric Teichman. London: Hodder & Stoughton (1937). 221 pp.

²³ Emil Bretschneider: *Map of China*. Second thoroughly revised and enlarged edition. St. Petersburg: A. Iliin 1900. 4 sheets.

other with here and there black earth. At an elevation of 11,850 feet the valley divides, and the trail follows a central ridge over grassy slopes; here we encountered the huge black vultures *Aegypius monachus* (Linn.), of which we later shot one for a specimen.

Over a gradual incline the trail leads to the top of the ridge and a pass called the Chin-yang ling ta-pan 金羊嶺達板, also written 景陽嶺 which would indicate that the Chinese is a transcription of either a Tibetan or Mongol name, but it may be that the pass has two Chinese names for the first means Golden Sheep peak, and the second Viewing the Sun Peak; ta-pan is superfluous for it is the Mongolian for peak, or pass. The spur is the divide between the Yellow River and the Central Asian basin, all streams flowing north of here have no outlet and loose themselves in the sands of the Gobi; the height of the pass is 12,500 feet. The descent on the western side is even more gentle than the approach from the east. Everywhere the eye beholds a maze of hills covered with snow. In the north-northwest is a high rocky range some 18,000 feet or more, but with little snow, this is the Nan Shan of which more later. While west in the distance is a fairly high isolated mountain I judged to be 17,000 feet in height. This is the Niu-hsin Shan 牛心山 or Bullock-Heart Mountain whose forests we later explored.

The Region of O-po

On the plain before us grazed large herds of gazelles, the Chinese Huang-yang 黃羊 or the yellow sheep, actually deer, but they are very pale fawn-colored and hardly yellow; they are very wary and difficult to approach. On the plain which is 1,500 feet elevation, lies the lonely, walled town called O-po-ch'eng 俄博城, also written 峨博城, situated at an elevation of 11,600 feet in a sea of grass and at the foot of bare grass-covered loess hills. Opposite, looking south, is, what I designate as the North Koko Nor barrier range but which is part of the Nan Shan 南山 whose ramifications are explained in the next chapter.

O-po, Obo in Mongolian, is surrounded by a high mud wall crowned with rock battlements, the gates are massive, built of fired brick, and of considerable thickness. On entering the place one is greeted by the same deserted appearance and emptiness as at Wei-yüan or Pei-ta-t'ung. The houses are low and entirely constructed of mud bricks, the streets dirty and dusty.

According to Chinese records it was impossible for any one to live here on account of constant raids by Tibetan bandits, thus forcing people to move elsewhere. The historical account of this place will appear in the Historical Geography of this region. The town boasts of two temples adjoining the north wall, but like the houses are in a terrible state of repair. O-po is the western border of the Wei-yüan district.

The Nan Shan shan-mo 南山山脈 or the Mountain System of the Nan Shan (South Mountain)

Nan Shan or the South mountain range owes its name to its position for it lies south of the vast Gobi desert; otherwise the term would be a misnomer, for it is the last chain which skirts the Koko Nor province in the north. It forms the northern border of Ch'ing-

hai and the province of Kan-su which stretches like an arm between it and Ning-hsia 寧夏, touching Hsin-chiang 新疆 or the New Frontier, on the west.

The Nan Shan reaches approximately 20,000 feet in Mt. Ch'i-lien 祁連山 in the extreme western end of the range, and the same height in Mt. Konkhyr, the Chinese Kang-ka-erh 剛噶爾, in its eastern end. The two peaks seem to be the only ones which bear glaciers. To westerners the range is known as the Richthofen Range.

The Nan Shan actually comprises several ranges which extend parallel to each other and are in some places connected by lateral spurs, or merge into each other towards the west, with broad, almost plain-like, undulating valleys between them. They are so intricately connected in their western end that it is difficult to determine the exact limits of each. The multiplicity of names, not only those given them by the Chinese, but also those applied to them by the Tibetans and Mongols who live among them, (the latter more confined to the eastern end), make the problem still more difficult. The range immediately south and parallel to the main one, extending from northwest to southeast is called by the Chinese the T'o-lai Shan 托賴山 which must be a transcription of the Mongol name, viz., to-le = hare²⁴, evidently because of the many hares which have their retreats in these mountains, for the Chinese t'o-lai has no meaning. This range lies between the Nan Shan and the Ta-t'ung Shan 大通山, and similarly extends from northwest to southeast. A branch stretches south from where the Ta-t'ung Ho enters the valley of Wei-yüan or Pei-ta-t'ung called, the Ta-p'an Shan (see previous chapter). The T'o-lai Shan my North Koko nor barrier range, is opposite or south of O-po; on Chinese maps of Kan-su this range is also called the O-po Ta-nan Shan 峨博大南山 or the Great Nan Shan of O-po. In this range further west, in the district of Ba-bo, the Chinese Pa-pao 八寶 rises the beautiful, more or less isolated mountain called Niu-hsin Shan 牛心山 or Bullock-heart Mountain. All these ranges are snow covered but very few extend to the perpetual snow line.

The Nan Shan, facing north, is divided by the Chinese into three sections; each section is named after the town which lies to the north of it in Kan-su province, thus the westernmost which faces Su-chou 肅州 is designated as the Su-chou Nan Shan, the middle one facing Kan-chou 甘州 is designated as the Su-chou Kan-chou nan-shan, and the easternmost facing Liang-chou 涼州 the Liang-chou Nan Shan. The names of these towns have however been changed to Chiu-ch'üan 酒泉, Chang-yeh 張掖, and Wu-wei 武威 respectively. The northwestern end of the Nan Shan has also been named Ch'i-lien Shan 祁連山 after the highest peak in the extreme northwest of it. K. S. Hao²⁵ calls the eastern end the Mo-mo Shan, but I have never heard of such a name or seen it on any map, foreign or Chinese. On Chinese maps the character mo 脈 appears very often as it is attached to the name of the range plus the character for shan 山 = mountain, both meaning mountain system or mountain chain; I believe Hao has mistaken them and finding two mo characters close together took them for name, and called it Mo-mo Shan. He could not have been among these ranges, for on his map, which is completely out he marks the Kan-chou Ho as flowing between the Ch'i-lien Shan and what he calls Mo-mo Shan in a plain covered with brushwood, while the Kan-

²⁴ John Hangin: *A concise English-Mongolian dictionary*. Bloomington: Indiana University, The Hague: Mouton 1967, p. 103: hare – туудай.

²⁵ Kinshen Hao (Ho Ching-sheng) 郝景盛.

chou Ho 甘州河 cuts through the Kan-chou Nan Shan and flows in a terrific and impassable, red, sandstone gorge about 4,000 feet deep. It is even difficult or next to impossible to approach the mouth of that gorge into which the river tumbles in terrific cascades. I shall come back to his map later when describing the Am-nye Ma-chhen. (K. S. Hao: Pflanzengeographische Studien über den Kokonor-See etc. in *Botanische Jahrb.* Bd LXVIII, Heft 5. 1938)²⁶.

What has been said about the names of Nan Shan, holds also good for the streams which have their sources in these mountains. The spur known as Chin-yang-ling Ta-pan which is the watershed between the Yellow River and central Asia, sends one stream south called the Pai-shui Ho 白水河 which joins the Ta-t'ung Ho further south near the village of Hei-shih-t'ou 黑石頭, both entering the Hsi-ning River or Huang-yüan Ho which empties into the Yellow River. Flowing northwest and west is the Hei-kou Ho 黑溝河 which passes by O-po and becomes the O-po Ho (see Aurel Stein's map Kan-chou). The former is the name given to it by the local inhabitants. V. K. Ting on map no 20 of his Atlas of China gives it as Fu-niu Ho 伏牛河, and the C. G. S. L. S. map gives it as Hei Ho 黑河 or Black River; locally it is known as the Black Valley River. This river flows from the northern slopes of the T'o-lai Shan west, to where it is joined by a larger stream issuing from a valley further south and west, separated by a spur partly forested with *Picea asperata* Mast. This stream is locally known as the Hei-ho 黑河. It skirts a rocky bluff and joins the Ba-bo or Pa-pao Ho 八寶河, identical with Hei-kou Ho; from their confluence the stream is called the Kan-chou Ho. On Chinese maps and Aurel Stein's map it is marked as Kan-chou Ho. The mountain spur is of red sandstone, as is the gorge in which the Kan-chou Ho flows through the immense Nan Shan. No human foot has entered the gorge and it will forever remain impassable.

The Forests of the Nan Shan or Richthofen Range

The District of Pa-pao 八寶 or Ch'i-lien 祁連

The region known to the Tibetans as Ba-bo is called Ch'i-lien 祁連 by the Chinese who have transcribed the Tibetan name to Pa-pao 八寶. It adjoins O-po in the west and much gold is mined in the district. The ancient name of the region was Pa-pao ssu or Pa-pao monastery.

The valley in which O-po is situated extends northwest. A high mountain juts out from the T'o-lai Range into the valley. It was not marked on any map, and Sir Aurel Stein does not mention it, nor does he give its location, although it is one of the most prominent landmarks of the region, it is known to all as Niu-hsin Shan 牛心山 or Bullock-Heart Mountain.

The entire valley floor is pitted or foveate due to thousands of rodents, mostly hamsters which have here their underground haunts. Nothing but grass is visible; over the entire valley floor we found abandoned mud stoves, indicating that Mongols or Tibetans had their summer camps here and had moved to their winter encampments at lower altitudes. The valley floor is here 11,000 feet above the sea but gradually declines

²⁶ pp. 515-668. This was Hao's doctoral dissertation and originated from his participation in Sven Hedin's Sino-Swedish Expedition.

towards the west. Niu-hsin Shan is actually a huge promontory extending north from the T'o-lai Range and only connected with the latter by a low ridge. I estimate the height to be 17,000 feet, but not much snow was visible on its southern slopes and it had no glaciers, but the mountains back of it were heavily snow-covered though appeared lower.

Fifteen miles from O-po a large affluent, called the T'ien-p'eng Ho 天棚河 or the Celestial Tent River is reached, probably so named after the large nomad encampments to be found here in the summer. This river called T'ien-t'ung Ho on Aurel Stein's map, has its source in the south, in a 15,660 feet high mountain of the T'o-lai Range. At the mouth of this river gold is washed in a most primitive way. It is said that the gold for the roofs which cover the main temples at T'a-erh ssu 塔爾寺 or sKu-hbum, near Hsing-ning, came from this region.

The broad valley is actually composed of ridges or eroded, and gentle, grassy slopes, partly forested with *Picea asperata* Mast., while the stream meanders through the intersected plateau which connects the T'o-lai Shan and the Nan Shan proper. The T'o-lai Shan itself, that is its northern slope, is bare, snow streaked and eroded, with the summit appearing truncate. At one place the range is pierced by a large V-shaped valley showing another but connecting higher range, in the background.

An affluent from the T'o-lai Range, called the Lo-t'ou Ho 駱駝河 or Camel River, issues from a deep forested gorge which extends for a few miles into the range. It was the first really forested valley we had seen since leaving Kuo-mang ssu. Alas the spruces further up the valley proved again to be *Picea asperata*, no other species of *Picea* nor *Abies* could be found. The rocky cliffs of this valley are covered with *Juniperus zaidamensis* Kom., it has flat, glaucous branchlets, and dark, bluish-black, globose fruits. It covers the rocky slopes to the exclusion of nearly everything else, but the forest was dying. The underbrush consists mostly of willows, *Caragana jubata* Poir., *Sibiraea laevigata* var. *angustata* Rehd. which Hao raised to a distinct species *S. angustata* (Rehd.) Hao, *Potentilla fruticosa* L., and the new grass *Brachypodium durum* Keng. Along the streambed with willows thrived *Hippophaë rhamnoides* L.

The *Picea* trees in this valley reached a height of from 80-100 feet with trunks of over two feet in diameter, the branches extended downwards at a sharp angle and hid the trunks; wherever the trees were healthy thick moss covered the ground, wherever the moss was absent the trees were dying. Here in this spruce forest, in the wilds of Central Asia, we collected a new bird *Prunella fulvescens Nadiae* B. & P.

The valley floor at 10,500 feet elevation was taken up completely with willows, and the ubiquitous *Hippophaë*, and *Sibiraea angustata* (Rehd.) Hao. Half way up the gorge *Picea* trees cease, and the slopes are partly covered with *Juniperus zaidamensis* Kom., with here and there a *Lonicera syringantha* Max.

Beyond the Lo-t'ou Ho we came to a tent lamasery, the first we had ever seen. It was situated on the western slopes of a ravine at the outskirts of spruce forest; the tents were the round Mongol yurts, of grey felt, and the lamasery was called Arig Ta-ssu (A-li-k'o Ta-ssu 阿利克大寺). Arig, here pronounced as if it sounded Arke, is a Mongol clan name, while ta-ssu 大寺 is Chinese and means large Buddhist monastery, or lamasery. Below the tent lamasery were the black yak hair tents of Tibetan nomads. The Tibetans cannot use wood in their tent ovens or stoves which are only fitted out for

burning sheep manure, hence the forests have here survived, while if Chinese had occupied the region, there would not have been a single tree left.

The Forest of Niu-hsin Shan

The *Picea* forest which covered this beautiful mountain from almost the valley floor to its upper third was again composed of a single species namely *P. asperata* Mast. The streambed was filled with poplars (*Populus suaveolens* Fisch.), willows, Hippophaë, *Lonicera syringantha* Max., while on the outskirts of the spruce forest, densely carpeted with moss, grew *Rosa wilmottiae* a shrub 3-4 feet, with oblong to ovoid fruits and very small, to minute, calycine teeth; it also occurred with the poplars in the streambed.

The scenery was superb, lovely meadows were bordered by beautiful forests, and to the north, across the stream, a limestone range reared its snow covered summit into a blue sky; what the region lacked in plant species it made up in scenic beauty as the photos testify.

The *Picea* trees were of great size, the cones and foliage appeared different, but apparently *Picea asperata* is a very variable species. We had observed no *Berberis* since leaving the Ta-t'ung Ho, but here we found a few bushes of the small fruited species *Berberis verna* Schneider, also met with on Lao-yeh Shan.

The streambed is here very broad and full of poplars, willows and the shrubs usually associated with them. Diagonally across rose a bold rocky range without a vestige of vegetation, and only long talus slopes or scree descended from the cliffs. Here the maps do not agree, the district is called Ba-bo in Mongolian and Pa-pao 八寶 in Chinese meaning the Eight Jewels, but I believe it to be a Chinese transcription of the Mongol name. The Chinese maps show a Pa-pao on the Ta-t'ung Ho or Hao-wei Ho 浩靈河 as the seat of a native official, it may be that the district extends across the T'o-lai Shan into the valley of the Ba-bo River.

The entire spruce forest of Niu-hsin Shan was devoid of undergrowth, thick moss only covered the ground. The forests extend to an elevation of 12,000 feet, apparently the timberline in this part of the Ch'ing-hai or Koko Nor province. Beyond 12,000 feet appeared scrub vegetation composed of willows, *Caragana jubata*, *C. pygmaea* (L.) DC., and *Potentilla fruticosa* L.; the *Caragana* had invaded however the spruce forest to half way up the mountain. Towards the 12,000 feet level spruce became stunted and a few extend above that elevation. There are still several thousand feet of mountain, but not a single tree or shrub could be observed.

The upper part of the mountain consists of crags and scree composed of gneiss, felsite and other metamorphic crystalline rocks. Undoubtedly in the summer time the upper slopes would repay the explorer with an abundance of herbaceous alpine, but in the limited time at our disposal and the long distance to be traversed to reach these regions, not forgetting the return journey of nearly a month to the base camp at Cho-ni on the T'ao river, made this impossible.

Birds were abundant in the spruce forests of Niu-hsin Shan, especially the Tibetan eared pheasant *Crossoptilon auritum* of a slate bluish grey color, with four long lyre-like, steel blue feathers in its bushy tail. It is smaller than its congener of Yün-nan and Hsi-k'ang in the south, but like it, roams the forests in groups of ten or more.

The natives steal its eggs and hatch them, selling the four lyre-like tail feathers which were then much in demand, but they never succeeded to breed the bird in captivity. Another pheasant which here roams the forests is the Blood Pheasant *Ithaginis sinensis-michaelis* Bianchi, it has a number of cousins in the forests of Yün-nan and in the mountains of Mu-li, but these belong to other races. We also shot here the three-toed woodpecker *Picooides tridactylus funebris* and many others. The blood pheasant, it may be remarked, differs also from those found in the forests of the Min Shan in Kan-su, in having a white crest of feathers on the heads of the male birds.

In the Ta-t'ung valley there exists a deciduous mixed forest with the same species of Rhododendrons as occur on the Ta-pan Shan, probably their northern limit, these forests of deciduous trees and their shrubby undergrowth are completely absent on the norther slopes of the T'o-lai Shan and on the southern slopes of the Nan Shan proper. Here we find only conifer forest composed of one species of *Picea (asperata)* and no undergrowth save two species of Caragana; the floor being covered with moss (*Mnium* sp.?). The vegetative zones are here very distinct. On the gravelly valley floor along the streams grow tall poplars *P. suaveolens*, *P. Simonii*, *Ulmus pumila*, and willows etc., while the slopes of the mountains up to 12,000 feet are covered with the coniferous forest mentioned, followed by a scrub vegetation mostly composed of willows. Alpine meadows are practically absent, the scrub vegetation being followed by rubble, boulders and scree covered with snow.

As we go further north across the Nan Shan, forests cease altogether, not a tree being visible anywhere except in narrow sheltered valleys. The lower slopes or lower mountain spurs are rounded superimposed with a thick deposit of loess and covered with grass, while *Picea asperata* trees grow on the crests. It is possible that they have once covered the slopes and have survived only on the summit.

Across the Nan Shan to Kan-chou 甘州 or Chang-yeh 張掖 in Kan-su Province

We decided to follow the Ba-bo Ho down stream to see if it was possible to follow it down the red sandstone gorge and through the Nan Shan to Kan-chou or Chang-yeh.

A short distance west, down stream the Ba-bo Ho receives an affluent called the T'ung-tzu Ho 潼子河; this river issues from the northern slopes of the T'o-lai Shan from a rather broad valley, with loess bluffs on both sides. In the flat rocky stream bed grew the usual poplars, willows, etc. Through the wide open valley steep snow covered peaks are visible and sharp ridges, enclosing near the summit, broad circular depressions full of snow, the beginning of a glacier. The height of these peaks ranges between 15,000 - 16,000 feet. The T'ung-tzu Ho flows into the Ba-bo Ho near Erh-ssu-t'an 二寺灘 or the Two Temple Rapid, its water being crystal clear; it is nameless on Aurel Stein's map. On the opposite side of the Nan Shan is loess covered in its lower slopes with vertical walls where streams have cut through them. From the main snow-covered backbone of the range rise two peaks of solid rock, apparently of the same composition as the Ta-t'ung Shan, as gneiss, felsite, and chlorite. The mountain is called Ma-lo-ho Shan 嗎羅河山 and is over 15,000 feet in height (see Plate 41).

Beyond Erh-ssu-t'an the Ba-bo Ho (Hei-kou Ho) makes a bend and flows northwest through a bare rocky red sandstone gorge. One and a half miles beyond it is joined by

the Hei Ho 黑河 or Black River issuing from the west behind a rather low red sandstone spur around which it flows, the spur jutting out into the Ba-bo Ho valley.

The mountains of the To-lai Range increase in height westwards, reaching 18,150 feet, less than twenty miles west of the confluence; the source of the Hei Ho being south of the peak Ch'i-lien Shan nearly 20,000 feet in height. At the confluence of the Ba-bo Ho and the much larger Hei Ho, which is at an elevation of 9,000 feet, is the hamlet of Huang-fan ta-ssu 黃番大寺 or the Yellow Barbarian Great Temple. The ridge which juts out into the Ba-bo Ho valley, separating the two streams, has its highest point about ten miles northwest as the crow flies, namely 17,080 feet, while directly opposite rises a higher peak in the T'o-lai Shan, 18,150 feet. The range which separates the Hei Ho and the Kan-chou Ho where it cuts through the Nan Shan is known as the Ch'i-lien Shan 祁連山. The gorge which dissects the Nan Shan and through which the Kan-chou Ho flows is still unsurveyed, as are the immediate mountains to the east and west of it. The gorge is impassable, an enormous volume of water rushes madly into it and continues between vertical walls of red sandstone. No human foot has ever ventured into that gorge, for there is no foothold anywhere, and as to the open valley and shrubbery through which Hao makes the river flow, and as he indicates on his map, this is nothing but invention. The stream emerges into a broader valley on the Kan-chou plain which is nearly always dry, as the river disappears underground, or what water does issue from the gorge is directed in ditches and channels for irrigation purposes.

The name Kan-chou Ho is applied to the stream formed by the confluence of the Hei Ho and the Ba-Bo Ho. The so-called ta-ssu or great temple is beyond the village, and is an abandoned empty lamasery. Here the valley is quite broad and so is the streambed; what is still extensively cultivated for a distance beyond the village. Immediately back of the village is a volcanic cone, of perfect proportions, deeply furrowed, and open on the southeast side, where it is cleft by a deep ravine to the very rim of the cone, it is a formation entirely foreign to the rest of the landscape. The cone is forested with *Picea asperata* Mast., on its northern slope. Large patches in the broad valley floor are covered with poplars, willows, *Hippophaë rhamnoides* L., etc. Five or six miles from Huang-fan ta-ssu the valley is wild and romantic, both sides being flanked by rugged red sandstone cliffs. On the western side is a peculiar cone of red sandstone the top of which had fallen in, leaving a black chimney-like hole. Niu-hsin Shan fills the valley looking south and appears from here as an isolated mountain mass.

On the sharper ridges to both sides of the valley are rows of spruces and on the steeper rocky bluffs grow *Juniperus zaidamensis* Kom. The river flows very swiftly along the foot of the vertical red sandstone wall making several sharp turns like the letter «S»; in the second turn there stands an island, part of the original valley floor which the river could not dislodge. In the north the valley is blocked by a snow streaked mountain about 14,000 feet in height. The stream enters a narrow defile and flows directly east into a terrific gorge, it is here where it pierces the great Nan Shan at an elevation of 8,500 feet, with the mountains rising thousands of feet above it, it drops 4,000 feet in a distance of about 55 miles as the crow flies to Kan-chou or Chang-yeh, which is at an elevation of 4,580 feet. The distance to where the stream reaches the plain is actually only about 40 miles, so the river drops an average of 100 feet per mile,

but the drop within the gorge must be considerably more, and perhaps actual waterfalls exist, but to penetrate the gorge is absolutely unfeasible.

Counting the height of the mountain to both sides of the gorge the latter must be over ten thousand feet deep and thus vies with the gorge the Yangtze has cut for itself far to the south, through the Li-chiang snow range in Yün-nan. The Kan-chou Ho gorge is however only a fraction of its width of that of the Yangtze gorge in Yün-nan.

There is an ideal camping place under huge poplars on a splendid meadow which the river crosses in sharp curves ere it enters the gorge. The face of the huge mountain mass which blocks the river and forces it through the sandstone gorge is covered with junipers while forests of *Picea asperata* Mast., cover the slopes of the mountain higher up, but the sandstone walls are bare of any vegetation.

By following the Hei-ho upstream and crossing a pass over the To-lai Shan into the valley of the Ta-t'ung Ho (Hao-wei Ho) and thence over the Ta-t'ung Shan, one can reach Tu-lan ssu 都蘭寺 directly south, and west of the Koko nor (Lake). There are also several trails and passes over the Nan Shan north to the Kan-chou plain. We shot a number of interesting birds and great Ma-chi or *Crossoptilon auritum*, also a fat flying squirrel the size of a dog, quite different from those found on the Mekong in Yün-nan. They are said to be plentiful on the Nan Shan and in the forests of the T'o-lai range where we shot it.

Crossing the Nan Shan is not an easy undertaking, especially when one wishes to traverse it by unfrequented paths and through ravines where forests could be found. Engaging a Tibetan guide he led us up an unfrequented valley with a narrow trail to a pass 12,350 feet; this pass was actually a frozen bog; here we found still flowering *Incarvillea compacta* Max., 1-2 feet tall, the valley being known by the Tibetan name Nag-sha-thar which our guide pronounced Nashthar. It extends from east to west surrounded by grassy hills, on the slopes of which grew *Potentilla fruticosa*, the only shrub.

From the pass a trail descends into an equally barren valley called Ch'ing-tung kou 青洞溝 or the Green Cave Valley, turning north, the valley being surrounded by rocky snow capped peaks. In the middle [---]²⁷ of the valley willows and *Caragana jubata* formed the only shrub vegetation. Crossing lateral ravines and several passes, one finally reaches the [---] pass of the range. It is called Chhar-lo Nye-ra or Rain (and) Lightning Pass, it is 13,350 feet above sea level. From here a splendid view could be had over the snow range, especially noteworthy [---] the peak Konkhyr in the east.

The valleys, gorges, ravines across the Nan Shan through which the Kan-chou plain is reached, harbor the same vegetation as the valleys south [---]. The north face of the Nan Shan, facing the desert is absolutely barren of tree growth. For herbaceous plants the season was too far advanced.

Looking north from an elevation of 9,800 feet from the lower spurs of the Nan Shan, we could behold in the hazy distance the plain of Kan-chou bordered in the north by the rather low range called Ho-li Shan a bare reddish range which on the east is adjoined by the Lung-shou Shan 龍首山 or Dragon Head Mountain. The highest point of the former is a peak of 12,000 feet directly north of Tung-lo Hsien 東樂縣 now called

²⁷ Passages (usually 1 word) not legible in copy.

Min-lo Hsien 民樂縣. The height of the range diminishes towards the west, the last peak being 7710 feet. Beyond the range is the Gobi desert and the province of Ning-hsia.

To the east is a huge plain which adjoins the horizon, and there lies the cart road through dust to Liang-chou 涼州 now called Wu-wei 武威.

From Kan-chou to Su-chou now called Chiu-ch'üan 酒泉 or Fountain of Alcohol is a six to seven days journey along the highway to Chinese Turkestan or Hsin-chiang, the New Frontier. *Picea asperata* forest is encountered en route at the end of the second stage at Ma-chia fan-ti 馬家番地, at the third stage at Lo-erh-chia 羅兒家, and then three miles from the latter place at Pa-ko-chia 八個家.

On the plain of Kan-chou *Elaeagnus angustifolia* L., occurs both wild and cultivated, while in the desert areas around the city the composite *Echinops Turzianowi* Ledeb., is quite common in company with *Tribulus terrestris* L. Of *Ulmus pumila* L., large trees 60-80 feet in height with large spreading and ascending crown are plentiful at the foot of the Nan Shan and on the Kan-chou plain and so is *Populus nigra* L.

The eastern end of the Nan Shan is dissected by a famous gorge the Pien-tu-k'ou 扁都口 which leads directly to O-po. Other valleys lead into the Nan Shan but not across it, as the Li-yüan kou 梨園溝 or Pear Garden Valley whose condition however belies its name, for there are neither pears nor any other vegetation except *Nitraria Schoberi* L., a widely distributed shrub which extends from Central Asia to north China, and its constant companion *Zygophyllum xanthoxylum* Maxim., which is at home from Mongolia to Chinese Turkestan.

The valley represents arid conditions; the spurs are composed of red eroded sandstone, sculptured to an unbelievable degree. On the valley floor along a small stream grow large willow bushes with very fine branches and very narrow leaves, as yet undetermined. Under them a type of stone pheasant *Phasianus colchicus sohokhotensis* Baturl., played hide and seek, while the new *Ianthocinclia elliottii perbona* B. & P. hopped among its branches.

From Li-yüan-k'ou a trail leads to the top of a plateau through a corkscrew-like ravine where three species of Berberis, *B. caroli* Schneid., *B. verna* Schn. and *B. Boschanii* Schn., flourished. Large fat hares were abundant and scurried about by the hundreds, stalked by the Tibetan lynx which the Chinese call She-li. Other plants were *Sorbus tianschanica* Rupr., and *Potentilla fruticosa* L.; feeding on the fruits of the former we found the very rare rose finch *Erythrura rubicilloides rubicilloides* (Przew.) B. & P.

From the top of the much eroded loess plateau at an elevation of 8,600 feet a wonderful view can be had over the entire Nan Shan or Ch'i-lien Shan, the range which extends beyond Su-chou or Chiu-ch'üan. The plateau extends gradually up to the snow range. The latter is very precipitous in its southeastern end, but towards the center much broken up, with two prominent rocky peaks in the northwestern limit, after which the range dwindles. At the southeastern end it terminates abruptly leaving a broad gap, on the other side of which another range commences with a gradual slope. Behind the gap is visible a high snow range parallel to the northern one, but it is not here where the Kan-chou River cuts through the range but much further east.

At the yellow monastery of K'ang-lung ssu 康龍寺, hidden among the valleys of the Nan Shan are extensive forests of *Picea asperata* Mast., which cover the mountain

slopes, while *Iris ensata* is the sole occupant of the valley floors. The forests extend for over a hundred miles to other monasteries as Ch'ang-kou ssu 長溝寺 or the Long Valley Lamasery, Shui-kuan ssu 水關寺, and many others. There are in all seventeen lamaseries scattered among the valleys along the Nan Shan or Ch'i-lien Shan, all of them surrounded by *Picea* forest.

Of all the conifers introduced by me to America this species of spruce has proved the hardiest. It has been planted on the coast of Massachusetts where it has endured intense cold and the furious gales which blow from the sea, where other trees succumb. Its hardiness accounts for its wide distribution in the most inhospitable areas of Ch'ing-hai province (Koko Nor) where no other conifers save junipers can thrive, and finding no competition became the sole occupant of those cold and bleak regions. That it can thrive at sea level in the New England States, when it rarely goes below 9,000 feet in its native home, is proof of its adaptability.

As to the Pien-tu-k'ou gorge which leads across the eastern end of the Nan Shan to O-po, suffice it to say that it is rocky in the extreme, the only tree we encountered were a few stunted *Picea asperata* trees and *Juniperus zaidamensis* Kom., the former only four to five feet tall, associated with them and scattered throughout the gorge were *Caragana jubata*, *Potentilla fruticosa*, and *Potentilla salesoviana* then in fruit, which until then had not been recorded from the Koko Nor or the Kan-su province. It is a handsome shrub with large white flowers and large leaves. It was previously known only from the Himalayas whence it extends to the Altai mountains.

From half way through the gorge south, all ligneous vegetation ceases, and the hills and slopes become grass-covered. A pass is reached called O-po-ling-tzu 峨博嶺子, elevation 11,400 feet, the divide between Kan-chou and O-po. A short distance beyond the pass, the gorge merges into the grassy waste of O-po.

The Region Between Hsi-ning and Hsün-hua

The land south of Hsi-ning is an undulating plateau mostly bare or grass-covered, and intersected by arid loess ravines and valleys of an average altitude of 8,500 feet.

The inhabitants are mostly Moslems who live in mud villages with usually a mud fort to which they can flee in case of danger from marauding Tibetans.

Some of the passes across the spurs which separate the valleys reach a height of 11,000 feet and more, especially those further south.

The trail leads at right angle to the valleys, forcing one continuously to descend and ascend. Southwest are peculiarly created mountains which form the Hsi-ning - Yellow River watershed. One of the spurs or passes encountered is the Hung-t'u ta-pan 紅土達板 or Red Earth Pass elevation 11,650 feet. The land is much broken up by valleys with a long range and several snow peaks in the background called the La-ya Shan 拉鴉山 probably identical with Hao's Lagi Schan, the latter name is neither Chinese nor Tibetan. A pass 12,335 feet in height leads over it. In a northwesterly direction extends another range called the Chiao-p'en Shan 校盤山 whose highest peak is 12,630 feet. After the village of Tsa-pa 雜巴 the valleys extend from north to south towards the Yellow River and the whole landscape is dusty, the mountains are eroded and clouds of

dust envelope the traveler. Hua-lung 化隆, the former Pa-yen-jung 巴燕戎 is situated on a spur at an elevation of 10,250 feet, with a mountain range to the east extending north called Pai-lu-ling 白鹿嶺 or the White Deer Range. The surrounding hills are loess and absolutely bare except on a small ridge on which a lamasery is situated called P'i-chia ssu 皮家寺 and where groves of junipers and spruces could be seen. A stream leads here to the Yellow River; the former has its source in a 10,900 feet pass. The surrounding hills are cultivated while the rest of the country is absolutely bare of vegetation. Hua-lung is inhabited by Chinese and Moslems, the latter being the overlords, the Chinese living in constant fear of the Mohammedans who retained there a fair-sized cavalry-garrison.

Beyond Hua-lung Tibetan villages are encountered with the surrounding hills terraced and cultivated. In the south a long snow range extends from east to west with a maze of intervening valleys between Hua-lung and the former. The geological formation is red sandstone or red conglomerate superimposed with grey loess. From a pass of 10,550 feet one descends to a flat spur whence an extraordinary view can be had. There are thousands of grass-covered knolls or knobs the country having the appearance of a rough sea; the knolls are abrupt and eroded while the whole is surrounded by walls of red sandstone, weirdly sculptured. The land is cut up into loess ravines and innumerable trenches, the surface washed away and only skeletons of the surrounding hills remain, every bit of surface soil, loess or whatever the covering might have been washed away into the Yellow River. The red gravel mountains have more the appearance of conglomerations of Buddhist stupas, towers or temples. Everywhere is dust and gravel, the bad lands of northwest China. The region is called La-mu Shan 拉木山, elevation 8,000 feet, as is a village at the foot of the eroded plateau at an elevation of 7,600 feet. The Yellow River is visible from the plateau, its valley extending from west to east. From here on only Salar Mohammedan villages are encountered till the village of Kan-tu 甘都 mainly inhabited by Salar and Chinese, is reached. The latter is situated near the mouth of the valley which debouches from La-mu-shan into the Yellow River a distance of seven miles. To both sides of the valley are weird mountains recalling skeletons of dinosaurs, extending into the Yellow River; the eastern one is called Tung Shan 東山 and the western one Wa-chih Shan 哇只山 with a deep valley west of the latter called Chieh-t'ang kou 圪塄溝.

Below the western cliffs is a lamasery with numerous caves or holes dug into the gravel for Buddha niches, the monastery is called Kan-tu ssu 甘都寺. The village itself is situated on the north bank of the Yellow River at an elevation of 7,300 feet, but quite a distance from the latter and near the foot of the eroded mountains, the gravelly strata of which is of a pale brick red and superimposed with a pale yellowish, drab-colored loess, The region itself is absolute desert in spite of the streams which are diverted however into irrigation ditches and give life to the land.

Here the Salar are ignorant of the Salar language and live in peace with Tibetans and Chinese. Chinese weeping willows are planted everywhere within the village.

Beyond Kan-tu the desert, a dry loess plain, is intersected by deep channels, these originate with a single hole in the ground where the loess is apparently less densely packed, the water boring down to the base of the plateau leaving standing columns of loess 50-60 feet high, and often 40 feet in diameter, a regular labyrinth of underground

channels, the detached loess blocks leaning and ready drop, form a regular forest of loess columns carved out of the plateau.

Three miles from Kan-tu is the ferry across the Yellow River, its waters a yellowish green in the winter. On the south bank is situated the Hsien city of Hsün-hua 循化 the seat of the Salar Moslems, surrounded by desert. The wall of the town is in good condition and the interior clean, with broad streets and gutters to both sides something unheard of in Chinese towns. The eastern end of the town is empty, the yamen is in the middle of the otherwise forlorn village. The Yellow River valley is here broad, the enclosing walls are red sandstone superimposed with loess. Habitation exists only where lateral valleys empty their streams into the Yellow River, the latter flowing too deep for irrigation purposes, pumping machines being unknown.

The Region Between Hsün-hua and La-brang

Three miles beyond Hsün-hua is the village of Shih-hang 石巷 situated on a bluff overlooking the Yellow River which makes here a sharp turn, the walls are steep, whole gravelly islands are in the center of the streambed. The Salar men all dress in black, also their women folk, except young girls who wear either pink or green clothes and usually a green turban like Chinese women in Kan-su, they had bound feet.

Nightly high winds blowing down the Yellow River valley enshroud the country in dust so that breathing becomes very difficult and grit between one's teeth is constant.

From Shih-hang a trail leads south up a broad valley flanked by phantastic mountains and cliffs robbed of every bit of soil making them appear like huge gothic cathedrals one joining the other, a succession of nature's master pieces of erosion. The stream which here issues is known as the Ch'ing-shui Ho 清水河 or the Clear Water River. The villages, including the larger one called Yai-man 崖漫 are all inhabited by Salar Moslems, at the latter a Salar garrison being stationed.

Between Yai-man and La-brang is wilderness and no villages are encountered. R. C. Ching denies that there is a trail, but a trail exists, although rather difficult and the happy hunting ground of robbers. The vegetation is first a xerophytic one, Berberis bushes forming the main vegetation with Caragana, *Potentilla fruticosa* L., and here and there a conifer. At 11,000 feet *Incarvillea* becomes very common. Beyond the valley a pass 12,250 feet elevation leads to the grasslands where nomad tents make their appearance of the black, yak-hair variety, and down a ravine wooded with Berberis etc. The ravine merges into a grassy plain surrounded by bare hills and mountains. In a grayish cliff, peculiarly sculptured like the naves of a gothic church, prehistoric remains of man were said to occur, but the presence of robbers did not permit lingering in the region. At the foot of the cliffs on a grassy slope is a small lamasery, the Pai-shih-yai ssu 白石崖寺, or White Rock Monastery, it could not have been erected in a lonelier place. Cold winds sweep the plain from the north. There is not a shrub or tree, the only fuel being dung.

The little brook, a sheet of ice meandering like a white snake through the waste of grass, such is the aspect of this inhospitable country. From Pai-shih-yai ssu it is 14 miles to La-brang, the latter being separated from the grassy plain by a spur over which a pass leads at 11,500 feet.

La-brang itself is the filthiest monastery I have ever encountered. Frozen dead dogs lie about in the middle of the roads, and dead birds, sheep wool, stagnant blood, coagulated lumps, and large pools of blood from slaughtered animals, entrails and legs of yak and sheep, dirt and rubbish in which chickens and dogs rummaged, littered the landscape. In the village the Moslem were slaughtering animals and buckets of blood were dumped into the middle of the street. The fences or enclosures are of the bones of slaughtered animals; added to all this fierce gusts of wind which envelop the place in clouds of dust and one has a picture of La-brang, whose elevation is 8,585 feet above sea.

The Yellow River

The two lakes which form the source of the Yellow River had been explored by d'Anville²⁸, rediscovered by Przewalski, and visited by many travelers including Sven Hedin, Filchner and others. The actual source of the river is considerably farther west than the two lakes which are fed by springs of the Odontala or Starry Steppe thus called by the Mongols, sKar-ma-thang or the Starry Plain by the Tibetans, and Hsing-su hai 星宿海, Constellation Sea or Starry Sea by the Chinese, on account of the innumerable lakelets which cover that vast area. This marshy tract has a circumference of about 100 miles, its waters unite to form a stream called Altyn-gol by the Mongols; this feeds the first of the two lakes called Cha-ring nor, the smaller of the two; the eastern one, the O-ring nor, their names appear thus on western maps. The lakes are situated at an elevation of 14,000 feet, and are connected by a channel. Into this channel empty two streams, the longer called the Djaghing gol, is 110 miles long and extends from southwest to northeast into the channel; the other is a shorter one coming from the south, and empties near the eastern end of the channel into it. The Tibetan names of the two lakes are sKyaring mtsho, pronounced Kya-ring Tsho, and sNgo-ring mtsho, pronounced Ngo-ring Tsho. The Chinese transcribe the names phonetically Cha-ling Hai 扎陵海 and O-ling Hai 鄂陵海, respectively. The river which issues from the northeast end of the O-ring Nor flows east as the rMa Chhu of the Tibetans, to become the Huang Ho 黄河 near Kuei-te 貴德 where it enters China proper.

We explored the unknown gorges of the Yellow River from the mouth of the rDorgan nang (valley) which the Tibetans call the sGo-chhen or the Great Gate, southeast of Ra-rgya monastery to beyond the mouth of the brGyud-par River, pronounced Gyü-par (Chhu) River, southwest of Kuei-te. All the land which lies between Ra-rgya Gon-pa on the right bank of the Yellow River to, and including the northern slopes of the Gyü-par Range. Crossed all of its tributaries which debouch into it from the east, and explored botanically and ornithologically all the large valleys that are wooded in their lower reaches.

²⁸ Jean Baptiste Bourguignon d'Anville, 1697-1782, French geographer and outstanding cartographer. Here reference seems to be made to his *Nouvel atlas de la Chine*. La Haye: Henri Scheurleer 1737. 11 pp., 42 maps. The atlas assembles maps from Jesuit sources, previously included in Du Halde's *Description ... de la Chine*. 1736. Anville never visited China.

The grasslands which extend to the gorges of the Yellow River (north of Ra-gya) represent undulating plains of an average height of 12,000 feet, dissected by a few long valleys extending from east to west, while others extend from south to north and vice versa, with passes between them reaching altitudes of over 14,000 feet. The larger valleys are reversed, i.e., their heads are wide and flat, having their source in the undulating grasslands; they becoming deep narrow, impassable gorges as they near the Yellow River. Grass covers deep loess deposits, while the underlying strata is either schist, slate, sandstone, and conglomerate which is visible in the lower sections of the valleys and in the gorges of the Yellow River proper.

At Gochhen the elevation of the Yellow River is 10,308 feet, and in the north at the Gyü-par valley it is over 9,000 feet, while its source is at 14,000 feet elevation, a drop of nearly 5,000 feet in a distance of about 400 miles, measured directly west as the crow flies.

Its largest tributary on its right bank is the hBaa, pronounced Bâ River, which flows the whole length of the Gyü-par Range some three miles to the south of it, in a more or less shallow valley being about 650 feet, in its central part, below the loess plain through which it has cut its course; it debouches into the Yellow River a little below the Chhu-ngön River coming from the west.

The rival of the Bâ River is the Tshe Chhu, the second largest tributary of the Yellow River west of the T'ao River. The Tshe Chhu has its source in the grasslands of the sBabo-mar (Ba-wo-mar) and the Rong-wo tribes; the largest of the branches, known from its source as the Tshe Chhu, issues from the northeastern (Tshe-sde-ra elevation) one which flows parallel before uniting to form the main Tshe Chhu, is called Chha-shing Chhu. The two streams are shallow and flow east in marshy grassland which they enclose; here are two grass-covered mountains, the westernmost the Ma-mo-ren-chhung-ba (Ma-mo ren-chhung-wa) and the eastern one the Na-mo-ri-on-rdza-sde (Na-mo-ri Ön-dza-de) [Plate 42], while the plain itself is called the Na-mo-ran-thang, pronounced Na-mo-gen-thang; it is the territory of the Hor-pa or Hor tribes. Here is neither tree nor shrub, nothing breaks the monotony of the landscape except the black tents of the Hor tribes. We saw no antilopes, but wolves going singly in search of food, while huge eagles and Lämmergeier soared at great heights, or hovered near a camp waiting for the departure of a caravan.

The two main branches of the Tshe Chhu unite north of a mountain called the Sa-ri-mkhar-sgo, the stream flows in a curve southeast, where it strikes a hill called Seng-ge khang-chhags, there it makes a sharp curve around it, and is forced south by another mountain to the west of it, the Am-nye sgar-dang. It flows directly south when three mountains necessitate it to flow west, leaving two within the knee called collectively the Yur-ran-ri; here are also the remnants of a lamasery called mGur-sgar (Gur-gar) while the third mountain to the south of it, forces the river to flow between them, the third mountain rising from the flat plain is called the Ma-mo shar-snying (Ma-mo shar-nying). Here there is a ford, the stream turns east-southeast, cutting deeper into the plain as it approaches the Yellow River, and finally debouches into it through a narrow gorge, as do most of the streams which have their sources in the grasslands.

The Tshe Chhu receives a number of affluents which rise within the quadrangle the river forms, the longest, having its source on the southern slopes of Sa-ri mkhar-sgo, is

the Chhu-nag nang or the Black River which flows due south and parallel to the Tshe Chhu. The affluents flow in shallow valleys separated by rounded spurs over which passes lead westwards. The Tshe Chhu enters the Yellow River south of a mountain called the A-rig dzo-rgon-ma.

The next in size is the Gyü-par stream which flows from southeast to northwest, having its source below the Tho-thug pass, elevation 13,900 feet. It debouches into the Yellow River opposite A-tshogs dgon-pa, pronounced A-tshog Gom-pa, a lamasery on the left bank of the Yellow River. It flows to the north of the Gyü-par range and receives several small affluents from the range on the left, and from the plain to the northeast, the largest being the hJu-chhung as seen by us, but according to the name, which means the Small hJu stream, there must be a still larger one or hJu-chhen, the Large hJu, but which we could not locate.

Beyond the hJu-chhung stream, in a northeasterly direction, is the waterless plateau called Ma-la-dge-thang (Ma-la-ge-thang).

One stream which has its source west of the Tho-thug pass, called the Mu-gyang, debouches directly west, cutting through the loess into the Yellow River valley.

South of the Bâ valley are two tributaries, the northern one the hJang-chhen, and the southern one the hJang-chhung, i.e., the Large and Small hJang (River), respectively. Both have their sources west of Dzo-mo La or the Half-Breed Yak Cow Pass. There are still other smaller ones of which we could not learn the names.

South of the Jang-chhung, is the sTag-so-nang, Tag-so Valley, carrying a stream from east to west. To the southeast of the Tag-so stream is the Long Gold Valley or gSer-chhen nang (Ser-chhen Nang) which has its source in the Tshe-sde-ra pass, pronounced Tshe-de-ra, elevation 13,550 feet, it debouches into the Yellow River west of gTsang-sgar (Tsang-gar)(monastery) where the Yellow River makes a bend flowing directly west towards its source. All the other smaller tributaries will be described in the travel narrative and botanical account of the region.

On the left or west side of the Yellow River the largest tributary is the Chhu-ngön or the Blue River, it carries the greatest amount of water to the Yellow River or rMa-chhu (Ma-chhu). It comes from the western side of the Am-nye Ma-chhen, but flows first in a wide curve northwards following the common direction of the rocks, and debouches into the Yellow River in an east-southeasterly direction a little above the mouth of the Bâ River. It flows in a deep gorge with precipitous walls cut into the slate and silicious schist; nowhere is it fordable owing to the rapid fall of the water. Like the Yellow River it has immense cataracts but no actual waterfalls. In parts it is forested with *Picea asperata* Mast., the spruce so common in this region.

North of the Chhu-ngön is the Hang Chhu, the Chinese Ta-ho 大河, in which a small Mohammedan garrison is, or was stationed, in its upper course where the Hsining – Lhasa trail crosses it. The new name which the Chinese have given the place (the old one was Ta-ho-pa or the Great River Plain) is Hsing-hai 興海. It flows in a rather broad valley and debouches into the Yellow River 2° south of west, coming from west-northwest. There are terraces on both sides of the stream, with some forest and willow shrubs along its bank.

South of the Chhu-ngön is a smaller tributary called the hBrong-sde-nang pronounced Drong-de nang (valley) or the Wild Yak Valley.

Coming from the eastern slopes of the Am-nye Ma-chhen is the large Tshab Chhu which is formed by Ye Khog and Yün Khog (q.v.) respectively; before entering the Yellow River it receives an affluent from the south called the mGu-chhu or mGur-zhung. Other, smaller tributaries will be given in the description of the region west of the Yellow River.

The Great Loop of the Yellow River

Within the great knee of the Yellow River, here called rMa Chhu, there stretches a long mountain range uninterrupted from nothwest Long. 100° 15' to southeast 101° 30', which has been termed the Sarü-Dangerö Gebirge by Karl Futterer²⁹. He saw the range from south of the Yellow River which he says flows in a 10 km broad valley. He also states that he thinks the Sarü-Dangerö range certainly forms a part of the «Amne-matschin» Range.

Now as to his name Sarü-Dangerö for the range. I have already remarked that it is not the name of that long mountain chain; his «reü» and «rö» are identical with the Tibetan ri mountain peak. The range has two high peaks, one called Sa-ri at 101°15' Long., and a northwestern one Dang-ri at 101° Long., these astronomical positions are approximate only.

Many tributaries of the Yellow River, flowing north and south within the Yellow River loop, have their source in that range for which we were given the name Sha-ri-yang-ra, it is the Chinese Ch'ang-shih-t'ou Shan 長石頭山 or the Long-Rocky Range.

Futterer states that the snow-capped peaks rise to over 5,000 meter (16,400 feet) and 1,650 m (5,413.3 feet), above the river, and that the broad river is bordered by rounded, graceful spurs above which rise the steep and rugged cliffs of the high range and its peaks. The upper third of the mountains was covered with snow but no glaciers were visible. The range is too low for glaciers, only mountains over 18,000 feet possess glaciers in this region. In the west the range becomes higher and towards the east it diminishes in height. Nowhere was there visible a breach which would indicate a large valley, or an intersection in the crest of the range. At about Long. 100° 15' it makes a turn north and is joined by another spur which extends from 100° to about 100°35' Long. It is hemmed in on its southern slope by the main branch of the rGu-gzhung (Gu-zhung) which has its source in the spur connecting the two ranges. On the other side of the transverse range flows the hDu Khog which must have its source in the western end of the main range. The largest tributary of the Yellow River flowing north, with its source on the northern slopes of the range is the Shi Chhu, in the large valley of which, the stream flows east and then northeast into the Yellow River. The Ngu-ra tribal lands commence, and extend north of the range to approximately 101°45' Long., to an isolated

²⁹ Karl Futterer, 1866-1906: *Geographische Skizze von Nordost-Tibet. Begleitworte zur Kartenaufnahme des Reiseweges vom Kûke-nur über den oberen Hoang-ho durchs Thao-Tal nach Min-tschôu*. Mit zwei Karten. Gotha: Justus Perthes 1903. 66 pp. (Petermanns Mitteilungen. Ergänzungsheft 143.) – *Durch Asien: Erfahrungen, Forschungen und Sammlungen während der von Amtmann Dr. Holderer unternommenen Reise*; mit Unterstützung des Grossherzoglich Badischen Minist. der Justiz, des Kultus und Unterrichts und des Naturwiss. Vereins in Karlsruhe hrsg. von K. Futterer. Berlin: D. Reimer 1901-1911. 3 vols.

mountain called Am-nye Ngu-ra, the mountain god of the Ngu-ra tribe. The head of the Shi Chhu consists of many branches, the southern one, the mKhar-sgo Nang cutting deeply into the range causing it to be considerably constricted.

The largest tributary with its source on the extreme southern slopes of the range is the Kho Chhu; it receives many affluents near its head where dwells the Tshang-hkhor-zhug-ma tribe, and whose encampments extend into the headwaters of the Gu-zhung River. In the central part of the Kho Chhu dwell the sGog-rnam Tibetans (Gog-nam), and in the lower part, to its confluence with the Yellow River and beyond, south of the river, into a southern tributary called the hJig Khog, the Khang-gsar mGo-log (Khang-sar Go-log) have their encampments. To the east of the Go-log territory is that of the lNga-ba (Nga-wa) tribe called lNga-sde (Nga-de) or lNga Khog or the Nga Valley, ruled by a chief. The daughter of the chief of the Nga-wa is the wife of the chief of the Bu-tshang Go-log both of whom we met at Ra-gya Gom-pa.

A trail extends at the foot of the southern slopes of the range crossing the head waters of all the southern tributaries over passes ranging from 13,654 feet in the west to 11,802 feet in the southeast. There is one stream, a northern tributary of the Yellow River, the Dwang-chhen Chhu or the Great Dwang River which has its source south of the range and dissects it about the center. This is however not visible from south of the Yellow River; it is the only tributary which pierces the range from southwest to northeast. A trail crosses its head waters south of the range. South of the central part of the range dwell the Mu-ra Tibetans whose encampments are bordered on the east by that of the Shag-chhung Clan.

Another tributary flowing partly parallel to the southern bend of the great loop and debouching in the Yellow River in a southeast and south direction is the gSer-zhwa Khog which flows at an altitude of from 12,451 feet to 11,800 feet; this stream receives an affluent called the Gong Khog, west of which, and north of the gSer-zhwa khog, dwell the sGar-tham Tibetans. The Gong Khog flows southwest of the last prominent peak in the easternmost part of the main range, the Lha-ri or the peak in the easternmost part of the main range, the Lha-ri or the Peak of the Gods. East of the latter are grasslands which extend to near the north bend of the Yellow River and isolated mountains of which the Yo-dar-tho-yi-ma is the most prominent. A trail passes to the east of it coming from two lamaseries to the south, the Shar-shu-ri-khrod (Shar-shu ri-thrö), and the mTshan-grags dgon-pa (Tshen-drag Gom-pa), and leading to the northern bend of the great loop of the Yellow River. Another trail branches off to the left (west), to Ngu-ra where there is a ferry across it.

Between Long. 100°30' and 100°45' the southern loop of the Yellow River turns north at an elevation of 11,639 feet (boiling point) where it is the recipient of two small tributaries, the mGo-mang, on the west and the A-ser-nang on the east.

In the extreme east end of the loop, but within it, is a large tributary called the gLang Chhu which flows from southwest to southeast through a great marsh known as the gLang Chhu mtsho-rGAN (Lang Chhu Tsho-gen), and directly east of the two lamaseries previously mentioned. Above the marsh on the west bank of the river, are extensive sand dunes.

About 30 miles south of the Yellow River, between longitude 100°45' and 101° (approximately) and 33°30' and 33°45' n. latitude there rises a most magnificent