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An Orographic Sketch of Korea.

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With Plates I—IV.

I. INTRODUCTION.

Korea is the Italy of Eastern Asia. It stretches out from the main body of Manchuria in a southerly direction between the *cul de sac* of the Yellow Sea and the Sea of Japan, both being fringing seas, as Italy projects between the Adriatic and the Mediterranean.

On the north and north-west the Korean peninsula is bounded by a well-defined topographic feature—the equatorial range of Chyang-päik-san, and a southerly-lying basin drained by the Amnok Gang¹⁾ and the Tu-man Gang. Similarly the peninsula of Italy is limited on the north by the Alps, and the plain of Po.

Both peninsulas stretch about 10 degrees meridionally ; Korea

1) The *Ya-lu-Kiang* (鴨綠江) of the Chinese, signifies the *duck-green river* from some resemblance of the colour of the river-water to that of a duck's neck. The *Gang* or *Kang* (江) signifies in the Korean large, and *chhyön* (川), *mul* or *nai* (水) small streams.

from 33° N. lat. to 43° N. lat.; Italy from 36 $\frac{1}{2}$ ° to 46 $\frac{1}{2}$ °. They lie, as we have seen above, in nearly the same latitude of the temperate zone, and enjoy an agreeable, transitional climate, neither too wet nor too dry. Both are inhabited by peoples of very ancient culture.

However similar in their general outlines, there are yet many points of dissimilarity, especially in regard to their internal geological components and structures, and their external land-forms. Italy is not wanting in young geologic formations, while Korea is in the main built up of Archæicum and Palæozoicum. Though both curve a little to the east, Korea is mountainous on the side of the Sea of Japan, and rather flat toward the Yellow Sea; while in Italy the Apennines run along the axis of the country.

This Asiatic Italy, fitly called by W.E. GRIFFIS the "Land of the Hermit Nation," was secluded from the rest of the world for a long time, and even her old neighbours, the Japanese and the Chinese were strictly and vigilantly prevented from penetrating into the country. It is a unique patch of the earth's surface, *terra incognita* in all respects, excepting eight free ports and the two inland towns, where over 20,000 Japanese and men of other nationalities have made themselves at home, but know nothing of what lies a few kilometers from them in the interior. Consequently, hitherto, only a few Westerners have made trips into the country, and studied the land and its people. Lately, I have twice made winter journeys in the peninsula, in 1900-'01, and 1901-'02, extending over fourteen months. I spent 266 days in travelling over the interior in a caravan-like suite with six men and four ponies, daily marching nearly 20 kilometers, and covering altogether 6,300 kilometers or 1,575 *ri*. As will be seen on the annexed map, my routes run nearly equidistant, crossing and recrossing the peninsula from one shore to the other, thus enabling me to get an idea of the general land-forms and

geology of the country, which were the main scopes of my two journeys.

As is well known, the outline of Italy is compared to that of a boot. That of Korea may be taken to represent a rabbit in a standing position with Chyöl-la Do¹⁾ for the hind legs, Chhyung-chhyöng Do for the anterior extremities, Hoang-hăi Do and Ph्योंg-an Do for the head, and Ham-gyöng Do for the disproportionately large ear; Kang-uön Do and Kyöng-syang²⁾ Do will then correspond to the shoulders and back.

The Koreans have their own fictitious representation of the outline of their country. The figure, they imagine, is that of an old man³⁾, his back bent with age, his arms folded in the attitude of paying paternal homage to China. They thought their country was by nature formed to be a dependency of the Middle Kingdom, and this notion drove its roots deep into the mind of the literary class, though it has been dispelled since the Sino-Japanese war of 1994-'95.

About Korea much has already been written from direct and indirect observations, but the descriptions of her land-features generally run in the same loose style in almost every work, without any principle based on the internal structure as manifested in the external topography. In my line of study I have only two names to mention, *viz.*, those of v. RICHTHOFEN and Dr. C. GOTTSCHÉ, whose works are,

1) The peninsula is divided into eight *Do* or departments, *viz.*, Hoang-hăi Do (黃海道) Ph्योंg-an Do (平安道), Ham-gyöng Do (咸鏡道), Kang-uön Do (江原道), Kyöng-geui Do (京畿道), Chhyung-chhyöng Do (忠清道), Chyöl-la Do (全羅道), Kyöng-syang Do (慶尙道), the latter, three being collectively called the *Sam-nam* or the Southern Three.

2) In Korean geographical names the *y* is mute when preceded by *s*.

3) No doubt, Korea is also geologically a very old land, to which fact I shall frequently advert in the sequel.

however, highly significant, and served to give me a general idea of the geography and geology of the peninsula.

Referring to the principal mountain range the latter¹⁾ says from his own personal observation that it runs along the eastern coast. On the north, the range trends from S.W. to N.E. (a part of the Hyang-san)²⁾; in the middle from N.N.W. to S.S.E. (the Thai-Päik-san), and on the south from N.E. to S.W. (the Syo-Päik-san). In the north-western peninsula, there runs meridionally an independent ridge which shifts the course of the Am-nok Gang. Generally the geological axes are identical with those of the mountains, one exception to this general rule being a small ridge, the Myör-ak-san, which traverses Hoang-häi Do at right-angles to the axis of the peninsula. The mountains owe their origin to two systems of earth-folds, and they never exceed the limit of 1,500 meters. In general the country is an extensive, but low mountainous land which approaches neither to the character of a plateau, nor that of a plain.—Thus far GOTTSCHÉ, who, it will be seen, has hit the mark so far as the fundamental elements of his topography are concerned.

In 1881, v. RICHTHOFEN³⁾ had already spoken of two systems of mountains in Korea, from an inspection of a map. “At right-angles to the axial direction of Liau-tung,” he says, “a long extended arm juts out to sea, forming the peninsula of Korea. It is attached to the continent at the north-west corner, where the peninsula has its greatest breadth, and here starts a land of different character which governs nearly the half (north) of all Korea, and is drained by two rivers, *viz.*, the Am-nok and the Tu-man. If we should try to reconstruct mountain-chains from the net-work of rivers and the

1) ‘*Geologische Skizze von Korea.*’ Sitzungsberichte der Kön. Preuss. Akad. der Wissenschaften zu Berlin, XXXVI, Berlin, 1886.

2) *San* or *moi* (山) signifies mountains.

3) ‘*China.*’ II. S. 131.

sudden turn of their courses, the most prominent one of the chains would undoubtedly be that of the Chang-pai-shan¹⁾ (Kor. Chyang-päik-san), which is the prolongation of the axis of Liau-tung, namely, W.S.W. to E.N.E."

It is quite otherwise for the rest of the peninsula. The direction (N.N.W.—S.S.E.) of the highly-elevated, eastern coast led him to suppose the knée at Mao-êrh-shan²⁾ of the Am-nok River was caused by the prolongation of the coast range which seems to penetrate far into the interior of the Nonni and Sungari regions. The existence of this old strike-direction in the gneisses of Shan-tung can be seen in some measure in the peninsular land-feature, though at later times the axis of folding in W.S.W. to E.N.E. became prevalent.

v. RICHTHOFEN'S wide experience in China, especially in Shan-tung, forces him to recognize this important tectonic line, which *I venture to call the Korean* in contrast to the Sinian. I will return to this Korean line in the sequel.

Korea had a good geographer a century ago, just as China had

1) Some confusion seems to exist in reference to the nomenclature of the sacred mountains on the border-land of Korea and Manchuria. The Manchus call the Ko-êrh-min-Shang-chien-Alin (歌爾民商堅阿鄰). In old Chinese books they are named Chang-pai-shan (長白山), T'u-t'ai-shan (徒太山), or Pai-shan (白山). At present, people call them Lao-tai-shan (老大山) or old great mountains, Chang-alin or long mountains, on the Manchurian side. On the opposite Korean side, the natives speak of them as Chyang-päik-san (Long-white Mountains), Po-tai-san (Rich-great Mountains), or Thai-päik-san (Great-white Mountains). The meanings attached to these names are all the same, signifying white or long white mountains. The peoples from the Manchurian, as well as from the Korean side seem to make no distinction between the long range and the volcano upon it which is at the same time the culminating point of the range.

I look at and describe the border-mountains from the Korean side, and call the range itself the *Chyang-päik-san*, and the volcano *Päik-tu-san* or the White-head Mountain. It should be noticed that there is another Chyang-päik-san in northern Ham-gyöng Do, which should be distinguished by prefixing *Syo* (*Small*). Wängler remarks (*Die geographische Verbreitung der Vulkane*, 1901, S. 25.) that Krahmer (*Russland in Asien*, IV.) writes Pei-to-san (for the volcano) instead of Paischan, the former, Korean, the latter, Chinese. This remark is likely to produce further confusion.

2) 帽兒山, a Chinese military station.

many in former days. The book *Chyo-sjön-phal-yök-chi*¹⁾ says: "The Kuen-lun system sends off the In-shan²⁾ range, etc. eastward through the south of *shamo* as far as I-wu-lu-shan³⁾, where it is cut off by the plain of Liau-tung; but it again rises to Päck-tu-san, which is what is called the Pul-ham-san⁴⁾ in the Buddhistic work *San-hăi-Kyöng*⁵⁾. From Päck-tu-san one ridge branches off northwards to Ninguta, while the right arm stretches southwards under the name of the *Korean Range*."

"This Korean Range starts from the before-mentioned Päck-tu-san, the sacred shrine and cradle of the Koreans, towards the coast-ridge—the Syo-Chyang-päck-san⁶⁾ of northern Ham-gyöng Do. It turns to the S.W. from the free port of Syöng-jin still following the coast, then southwards from Ham-heung, and is linked to the chains of Thyöl-lyöng⁷⁾ of Wön-san, Keum-gang-san⁸⁾ or the Diamond Mountains, and then to Thai-Päck-san⁹⁾ at the north corner of Kyöng-syang Do. While the last-named proceeds straight along the coast, one ridge shoots off to the S.W. under the general name of the Small or Syo-Päck-san, forming the boundary with Chhyung-chhyöng Do on the N.W. In its course, one ridge is again detached to the S.W. at Tög-yu-san¹⁰⁾ from the main stem, which traverses obliquely Chyöl-la Do, and reaches Hăi-nam, finally emerging in the island of Chyöi-jyu (Quelpart), off the south coast of the same province."

"Thus the main ridge runs along the east coast, forming the well-pronounced water-parting, so that most of the large rivers empty into the Yellow Sea, while the short and rapid streams all flow down to the Pyök-hăi or Blue Sea (the Sea of Japan). Between the

1) The author of this book (朝鮮八域誌) was I-Chyung-hoan (李重煥). 2) 陰山.
 3) 醫巫閭山. 4) 不成山. 5) 山海經.
 6) 小長白山. 7) 鐵嶺. 8) 金剛山.
 9) Thai or Great Päck-san (太伯山). 10) 德裕山 at the junction of three provinces.

Thai-Päik-san and Syo-Päik-san ranges, however, the Nak-tong Gang¹⁾ and Syöm-jin Gang²⁾ discharge their waters into the southern sea."

The above statement of the Korean geographer is in the main correct. If v. RICHTHOFEN had read I's description with the late HASSENSTEIN'S map³⁾ of Korea in hand, he could doubtless have drawn a good picture of the orography of the peninsula in his "*China*", or "*Morphologischen Studien aus Ostasien*," from his wide experience and deep knowledge of Eastern Asia.

II. NORTH AND SOUTH KOREA.

Before entering upon the subject proper, I will first of all speak of its two main divisions. If a line be drawn obliquely through the peninsula from Chyo-syön Bay (Broughton Bay) on the north-east to Kang-hoa Bay⁴⁾ near Ché-mul-pho⁵⁾, it will nearly coincide with the neck of the imaginary rabbit, and will divide the peninsula⁶⁾ approximately into two equal halves. The part lying to the north-west of this line comprises three departments of Ham-gyöng Do, Phyöng-an Do, and Hoang-häi Do. The corresponding south-eastern half includes the remaining five departments of Kyöng-

1) 洛東江.

2) 嶺津江.

3) Petermann's Geographische Mittheilungen. Jahrgang 1883, Tafel 10.

4) 江華灣.

5) 濟物浦.

6) The area of the peninsula is 218,650 sq. kilometers. With Italy, Japan, and Manchuria it is in the following proportions: 1: 1.3: 1.7: 4.3.

geui Do, Kang-uön Do, Chhyung-chhyöng Do, Chyöl-la Do, and Kyöng-syang Do. *I venture to call the former North and the latter South Korea.* This dividing line is not only convenient for *descriptive purposes*, but is almost a natural boundary.

Firstly, because it is the boundary of historical development. The north is the land of Keui-chă-Chyo-syön,—the oldest dynasty of Chinese origin, founded by Keui-chă¹⁾ (B.C. 2317). This was succeeded by the second Chyo-syön,—the dynasty²⁾ of the Ui family (B.C. 209—107). Having been for a while amalgamated with the Chinese Empire (the Han dynasty), it had fallen into the hands of the Pu-yö³⁾ invaders, who called the country Ko-ku-ryö⁴⁾ (B.C. 36—A.D. 672). These kingdoms had their rise and fall in the northern peninsula, and a part of Manchuria, or at their greatest their south boundary was the river Han, which flows through the heart of Kyöng-geui Do, and near the bank of which is situated the present capital Seoul (Han-syöng)⁵⁾.

In short, the north is the old Chyo-syön, while the south was little known during these early periods. Later, there had arisen in South Korea about B.C. 209 the Three Hans, *viz.*, Sin-Han⁶⁾, Pyön-Han⁷⁾, and Ma-Han⁸⁾. From the first two had sprung up in Kyöng-syang Do the Kingdom of Sil-la⁹⁾ (B.C. 57—A.D. 936), and from the last, Păik-chyöi¹⁰⁾ (B.C. 17—A.D. 660).

It was only in still later times that the whole peninsula was united under the one government of Ko-ryö¹¹⁾ or Korea (918—1392), which was replaced by the present I-family, the last Chyo-syön. With the rise of a new dynasty the name of the government is alter-

1) 箕子

2) 衛氏

3) 扶餘

4) 高句麗

5) 漢城(徐苑)

6) 辰韓 Chyöi-Han in Gale's *Korean-English Dictionary*, 1897.

7) 辨韓

8) 馬韓

9) 新羅

10) 百濟

11) 高麗

ed, and at the same time that of the country, just as is the case in China. The five-hundred years' existence of the I-family terminated in 1898, since which time the peninsula has gone under the name of *Tai Han*¹⁾.

Secondly, because the dividing line is the line of the least elevation of the land. Nowhere else do we find an easy path from the Sea of Japan to the opposite shore. The only passes from the free port of Wön-san viâ Seoul to Ché-mul-pho are the Thyöl-lyöng²⁾ and Chyuka-ka-ryöng³⁾, the first being situated on the east of the latter, and both being not far from Wön-san; we have to choose one of them for an overland route. The so-called Chyuk-ka-ryöng road has a marked topographic feature. It is a *rift valley* or *Graben* obliquely crossing the geological strike. From the top of Nam-san in Seoul, we see on the east a regular cliff with its escarpment toward us. It runs from the mouth of the Keum Gang⁴⁾ to the head of Wön-san harbour, and the well-fortified castle of Koang-jyu⁵⁾, 12 kilometers from the capital, stands on its edge. *I call this the Koang-jyu ridge.* The *other* ridge starts from the Ma-sing-nyöng⁶⁾, the highest pass of 1020 meters (the second pass A-ho-bi-nyöng being 760 meters), between Wön-san and Phyöng-yang, and lowers at the mouth of the Im-jin Gang⁷⁾. The Ma-sing-nyöng ridge turns its fault-scarp to the east, making the counterpart of the Koang-jyu ridge, thus forming the trench-fault. Great basalt flows occurred at the end of the Tertiary, filling up the bottom and now forming the sterile plain of Thyöl-uön⁸⁾ or iron plain, so named from some resemblance of the lava to magnetite. The Chyuk-ka-ryöng road goes gradually up this

1) 大韓

2) 鐵嶺. *Ryöng, lyöng, or nyöng* (嶺), and *koküi, kogüi or hyön* (峴), often affixed to local names, signify mountain-pass.

3) 竹駕嶺

4) 錦江

5) 廣州

6) 馬息嶺

7) 臨津江

8) 鐵原

lava-field, frequently crossing the canyon-like river-channel, and suddenly descends to Wön-san at the above-named pass, which is the edge of the basalt-mesa and the boundary of two provinces.

Thirdly, because this dividing line corresponds approximately to that of the climate. North Korea in this respect Manchurian, while the South is Japanese. The coast in the north is ice-barred for 3 months from the beginning of December. Even the south coast of Hoang-hăi Do is ice-barred as I have seen near Hăi-jyu¹⁾, while Chémul-pho, though not far off, is never frozen up. However, the coast of Ham-gyöng Do is comparatively warm as far as the mouth of the Tu-man Gang, and the shore is open during the whole year. While I was travelling, I counted the days warm, when temperature rose to -5°C . During three winter months I did not see the naked ground, and my caravan marched mostly on the smooth, frozen rivers, covered with fresh snows, especially on the Am-nok Gang. The average temperature at 6 a.m. in North Phyöng-an Do is -20°C .

A great contrast with the above conditions is presented by the climate of South Korea. I made a journey in this region during the winter-months of 1900-'01, so that I am able to make a comparison. Mountain-tops in the interior are capped with snow from December to February, but the rivers are frozen for only a few days. As we proceed south-east across mountain-ridges which trend from N.E.—S.W., that is to say, in the Sinian direction the climate becomes gradually warmer. Fusan²⁾, therefore, enjoys a mild climate, comparable with that of northern Kyushu of Japan which lies opposite.

Fourthly, because in respect to topography, North Korea is mountainous. The belt of land between the Chyang-păik-san range

1) 海州.

2) August, the hottest month of the year has an average temperature of 29°C ., and the other extreme, January 7°C . The mean annual temperature is 16.9°C . Snow falls only about once a year.

and the line drawn from the mouth of the Chhyöng-chhyön Gang and Ham-heung is the Kai-ma¹⁾ plateau. It embraces the northern halves (West and East Kai-ma) of Phyöng-an Do and Ham-gyöng Do. The Ham-gyöng Do portion is on average 1,000 meters high, that of Phyöng-an Do 600 meters. The plateau may without hesitation be compared with the Great Khingan (*Hsing-an*) and Inner Mongolia. South Korea on the other hand abounds in hills interspersed with plains.

Fifthly, because in consequence of the climatological and orographical conditions, the south is rich and fertile, producing the rice, the main staple of the country and hence being the granary of the peninsula. Various kinds of tall bamboos, which play an important rôle in household economy are only grown in the south. Their northern limit of growth, which is also that of the *Camellia Japonica*, is the oblique line drawn from the free port of Kun-san to Ul-chin at the south corner of Kang-uön Do.

Sixthly, because the physique and temper of the inhabitants differ in both halves. A Korean proverb says of the southern men and the northern women "*nam nam peuk nyö*", meaning that they are in bodily appearance more attractive than their respectively opposite sexes. The southerners are light-hearted and cunning, the northerners are silent and obstinate.

1) Kai-ma (蓋馬), one of the provinces of China before the Ku-ryö dynasty.

III. OROGRAPHY.

The fundamental features of the topography of Korea, as in other lands, are the result of internal geologic structure. Indeed the peninsula was the battle-ground of earth-movements of two directions—the *Sinian* and the *Liau-tung*. In the south of the lava-drowned rift-valley of Chyuk-ka-ryöng, already mentioned, the axes of crust-folds are mainly N.N.E.—S.S.W., *i.e.* the *Sinian*. In the extreme north (in the Kai-ma plateau), the fold-mountains run from W.S.W. to E.N.E. in the *Liau-tung* direction. The earth-movements had folded the core of gneiss-granite together with the overlying mantle of normal gneiss and mica-schist. The kernel of South Korea is the wedge-shaped massive of Chi-ri-san at the boundary of Chyöl-la Do and Kyöng-syang Do. That of the north is also the wedge-shaped massive of Kai-ma Land. These *Sinian* and *Liau-tung* massives, together with their overlying mantles meet each other with their apices, and struggle for the supremacy in north-eastern Ham-gyöng Do, thus leaving between them the third wedge of low neutral land.

Therefore, the peninsula is divisible orographically into 3 gigantic wedges. The south, embracing the whole of South Korea, is the old land of The Three Hans. North Korea is again divided into the Kai-ma plateau, and the *intersertal* wedge,—the land of old Chyo-syön or Paleo-Chyo-syön.

I have still to mention a *third element*. This time the earth-movement did not produce folds, but ruptured and dislodged the crust, tilting up the edge. The main edge runs N.N.W. to S.S.E., at the margin of the Sea of Japan, facing its high scarp to the deep shore. This tectonic disturbance, relatively of young age, produced prominent ridges which constitute the backbone and determine the present topography. The outline of the peninsula is due in

a great measure to this geological event. The block-edges I call collectively the *Korean Range*.

Having given this general skeleton, let me now proceed to details.

A. THE HAN LAND¹⁾.

South Korea is the land of the First Three Hans (B.C. 209—57), where the petty kingdoms led a very troublesome, ephemeral existence, waging among themselves never-ceasing war for the political ascendancy. Sin-Han (cap. Kyöng-jyu), and Pyön-Han (cap. Kim-häi) occupied the present Kyöng-syang Do, and from them later sprang up the Kingdom of Sil-la (cap. Kyöng-jyu, A.D. 57—926). Ma-Han (cap. Ik-san) had its home in Chyöl-la Do, Chhyung-chhyöng Do, and a part of Kyöng-geui Do, and developed into Sil-la's rival, Päik-chyöi (caps. Chik-san, Koang-jyu, modern Seoul, Ung-jin, and Pu-yö, B.C. 17—A.D. 660²⁾). The natural boundary of Kyöng-syang Do with the two western Do lies in the Syo-Päik-san range, and their ruined castles are still to be seen at the foot of the mountain-passes. We now return to the subject of orography.

a. THE SINIAN SYSTEM.

Starting from the free port of Mok-pho, and following up the

1) By the Han-land or the Three Hans, I mean the First Three Hans, viz., Ma-Han (馬韓), Pyön-Han (弁韓), and Sin-Han (辰韓). It must be understood that there were the Second Three Hans, arisen at later times. They were Sil-la (新羅), Päik-chyöi (百濟), and Ko-ku-ryö (高句麗), the latter embraced the whole North Korea, besides a part of southern Manchuria. I must also call the reader's attention not to confound Ko-ku-ryö (高句麗) of Pu-yö tribe with *Ko-ryö* (高麗). They were quite different dynasties that had existed in North Korea, the former being older. To avoid confusion, the former should better be called *Ku-ryö* (B.C. 36—A.D. 672), and not *Ko-ku-ryö*. From Ko-ryö (918—1392), the present European name Korea is derived.

2) Their struggles were the cause that led Japan to make the acquaintance of Korea in former days, in complying with the earnest request of one of these rivals for armed help. In return, the Koreans introduced the Chinese civilization into Japan.

Yöng-san Gang north-eastward through the plain of Na-jyu¹⁾, Koang-jyu²⁾, Tam-yang³⁾, and Syun-chhyang⁴⁾, we then turn to the north and proceed to Seoul through the plain of Chyön-jyu⁵⁾, the town of Kong-jyu⁶⁾, across the Keum Gang⁷⁾, and the plain of A-san⁸⁾, to the capital. This route passes through the wealthiest and most populous districts. Besides, we have to cross *two ridges* on the way.

a) The *first ridge* lies between Syun-chhyang and the general magisterial town Chyön-jyu, and this is *No-ryöng*⁹⁾. From Nam-uön¹⁰⁾ to Chyön-jyu, the road crosses the same ridge a little to the east,—Manma-koan¹¹⁾. This is a fold-mountain of normal gneiss, granite-gneiss and mica-schists, with the axis trending from S.W. to N.E. I consider this to be a *member of the Sinian System* which is typically folded in Fokien and neighbouring provinces in South China. Pumpelly¹²⁾ says that “a line drawn from near Canton, and passing through the Chusan archipelago, will represent the mean trend of the coast range (of China), and, if prolonged to the N.E., it will cut the Korean peninsula near its southern end.” I have simply to corroborate his wide-reaching assertion. It is very remarkable to see that in modern writings about Korea Pumpelly’s opinion on this point is consigned to oblivion.

The No-ryöng range disappears in the Ssang-chä¹³⁾ group of islands off the coast of Mok-pho, where still the forms of islets bespeak its natural connection. Each and every islet of the group appears like a shark’s tooth projecting from the surface of the sea; as a group they are arranged in the Sinian direction. To the north-

1) 羅州.

2) 光州.

3) 潭陽.

4) 淳昌.

5) 全州.

6) 公州.

7) 錦江.

8) 牙山.

9) 蘆嶺.

10) 南原.

11) 萬馬關.

12) ‘*Geological Researches in China, Mongolia, and Japan*,’ p. 2. Smithsonian Contribution to Knowledge, 1866.

13) 雙子嶺島.

east, the No-ryöng runs with its steep side towards the north-west till it reaches the Chhyu-phung-nyöng¹⁾ pass at the boundary of three provinces, where the projected Fusan-Seoul Railway will cross the highest point of the line (only 200 meters !). In Kyöng-syang Do, it is cut down to the east by the Syo-Päik-san²⁾ whose tilted edge runs obliquely to the No-ryöng from N.N.E. to S.S.W., culminating at the Chi-ri-san massive on the south, and terminating near the shore of Kang-neung³⁾ in southern Kang-uön Do. This Syo-Päik-san is one of the most important topographic elements in South Korea, separating Kyöng-syang Do on one hand from Chhyung-chhyöng Do and Chyöl-la Do on the other.

The old No-ryöng fold, after being submerged under the Kyöng-syang⁴⁾ formation, and further invaded by a gigantic laccolite of granite, reappears at Ul-chin⁵⁾ in the south corner of Kang-uön Do, still keeping its former strike-direction. This granitic area usually called the Thai-Päik-san⁶⁾ region embraces about 4,000 square kilometers. It is a tree-less tract, and the biotite-granite of the post-Permo-Triassic age is fast falling into ruins and disintegration through the action of the atmospheric agencies so as to be almost base-levelled into penepplain. The entire aspect of the country is dreary and desert-like. It is labyrinthic with rolling naked hills, and flat valley-bottoms are drowned in loose sand. The ground is dry and clean. It is the Seoul region of the south. Though we were here in the heart of Kyöng-syang Do, my barometer showed an altitude of but 150 meters, and a little to the west only 60. From Mun-gyöng⁷⁾ to the mouth of the Nak-tong it is 200 kilometers with a gradient of only 60 meters. The region is, therefore, a depression by denudation. We shall see

1) 秋豐嶺.

2) 小白山.

3) 江陵.

4) It is possibly of the Permo-Triassic age.

5) 蔚珍.

6) 太伯山.

7) 開慶.

hereafter such *erosion hollows* in many parts of Korea, always in *granitic districts*.

The No-ryöng range, so far as we have seen, is a fold-mountain, and is the oldest and the southernmost range of the Sinian system in the whole peninsula.

β) After passing Chyön-jyu¹⁾, and Kong-jyu, and crossing the Keum Gang northwards to Seoul, we have to ascend the pass of *Chhya-ryöng*²⁾ to On-yang-do³⁾. Broadly speaking, it is a synclinal ridge of mica-schist mantle upon gneiss. It probably commences in the Heuk-san Group⁴⁾ in the Yellow Sea, and runs through a group of islets off the free port of Kun-san⁵⁾. It then enters Chhyung-chhyöng Do, and makes the above-named Chhya-ryöng pass. It is much disturbed on the north-east by the intrusions of large masses of microgranite and granite-porphry.

The mica-schists disappear in the heart of Kang-uön Do, being replaced by shallow folds of granite-gneiss, which are sharply faulted in the *Tai-koal-lyöng region*⁶⁾ between Kang-neung and Ko-syöng⁷⁾, still keeping the original direction of strike. The folded ridge, which has been traced thus far, I call collectively the *Chhya-ryöng range*, which trends from N.N.E. to S.S.W. *It is the second of the geological line, belonging to the Sinian System.*

The whole complex is cut down obliquely by the already-mentioned Koang-jyu fault towards the north-west.

The No-ryöng and the Chhya-ryöng ridges are both of the Sinian System and are old earth-folds. On account of their

1) The word *jyu* (州), affixed to local names, always signifies a magisterial town of the first class, enclosed in stone-walls.

2) 車嶺.

4) 黑山麓島.

6) 大關嶺.

3) 溫陽渡.

5) 群山港.

7) 高城.

high antiquity, they are now reduced into stumped and well-nigh subdued mountains. Therefore, they cannot be recognized as ridges in a topography, though they still mark distinct water-partings.

b. THE KOREAN SYSTEM.

Another element which I have already treated in part, is the *Korean System*. This time the result of tectonic disturbance is not an earth-fold, but the *rupture* and *dislocation*. As this system originated at a somewhat later date than the preceding, probably post-Perm-Triassic, it has had a great effect upon the modern topography of not only South Korea, but also the whole peninsula; and not only on land-forms, but also on coast lines. We have to distinguish several members of somewhat diverse orientation in the system. I shall speak at first of the most important of these members.

a) THE THAI-PÄIK-SAN RANGE.

i. *Median Ridge*.--From Ta-thai-pho point¹⁾ at the mouth of the Nak-tong Gang²⁾, a meridional ridge of green porphyrite and granite with fault-scarp facing east, runs through Ön-yang³⁾ and Kyöng-jyu⁴⁾, Chhyöng-syong⁵⁾ and Yöng-yang⁶⁾, where the rocks are replaced by alternating beds of green tuffs and red shales. In the last-named district, the ridge intersects the No-ryöng range in granite-gneiss, and culminates near the Sa-gil-lyöng⁷⁾ pass at the crescent-shaped, and tree-covered *Thai-Päik-san*⁸⁾ of Paleozoic rocks (1,500 m.). The name of this mountain is known to every Korean and is regarded with some reverence, though the high peak itself presents to us no specially

1) 多太浦鎮.

2) 洛東江.

3) 彥陽.

4) At Chhyöng-gyöng-kokäi (淸鏡峴) it lowers to 200 meters.

5) 靑松.

6) 英陽.

7) 沙吉嶺.

8) 太伯山.

fantastic shape. *Hereafter I shall call the ridge, now under consideration, by this name.*

The Thai-Päik-san ridge sharply cuts off in the mountainous district of Sam-chhyök, the tilted edge of the Syo-Päik-san which equally faces eastwards with fault-scarps. The ridge now deflects a little westwards and continues through O-däi-san, noted for its pagodas, to the famous Keum-gang-san, terminating at Thong-chhyön, after pursuing a lengthy course of 480 kilometers. The cliff between Chyang-chyön Cove and Thong-chhyön fully exposes an oblique profile of the ridge, and detached clods of granite of monstrous shapes are seen in the sea retaining the former direction of the ridge. Scenery lovers of Korea frequent the shore and native-geographers style these islets the *Häi-Keum-gang* or Mid-sea Diamond Mountains.

Keum-gang-san or the Diamond Mountain (1,200 meters) is a large granitic stock, stretching north-south and penetrating Paleozoic rocks. It is excavated to its bottom by a crooked, canyon-like gorge, the precipitous wall overhanging the bottom and raising a multitude of grotesque heads; hence to the mountain not unusually the appellation of Twelve Thousand Peaks¹⁾ is given. The valley bottom and steep slope are forested with pine, the *Pinus pinea*, and maples, through which clear water rushes down in thousands of cataracts²⁾. About fifteen pagodas large and small have been here since the Sil-la period, some perched on rock heads, some buried deep in the forest giving shelter to world-renouncing monks and nuns. It is the Yosemite of Korea, and a favourite resort of Westerners.

ii. *Coastal Ridge*.—The Thai-Paik-san is really triple in structure; the one hitherto spoken of, is the middle and highest line. There is *another* lying to the east and parallel to the first, and this is

1) 一萬二千峰.

2) Man-phok-dong (萬瀑洞) or ten thousand water-falls.

similar in structure throwing down the *right* block directly to the level of the sea. The precipitous wall which we see landwards from the sea is the scarp of this easternmost fault. A belt of block interposed between the first and second ruptured planes often slants steeply landwards.

A *third structural line* is seen to run to the west and nearly parallel to these two lines, this time throwing down the *west wing*, and this movement creating the inland scarp-ridge. The Thai-Paik-san range resulted literally, in the geological language, from step-faults, and the whole stretch is a crust-block or *Horst*. I shall now trace the maritime ridge.

The *sea-board ridge* starts by the name of Tong-tai-san¹⁾ from Yöm-pho²⁾ (Tikhmenef Point) near Ul-san³⁾ cove, which is an inlet of the *rias* type. The coast between the harbour of Fusan and the cove of Ul-san was 300 years ago the landing place of the Japanese army under Hidéyoshi. The Tong-tai-san and its northern prolongation are a tilted block uplifted on its east side, slanting westwards; and remarkably granitic patches are seen between this and the median ridge, presenting the characteristic form of granitic mountains within an area of green rocks. The coastal ridge also marks the boundary of light-coloured rhyolite and its derivative sedimentaries of the Tertiary age. The shallow Yöng-il⁴⁾ (Unkofsky Bay) is within this geological formation. The ridge then proceeds northwards through Yöng-hăi⁵⁾, and Ul-chin⁶⁾. Sim-ni-kokăi⁷⁾ and Nölp-chhi⁸⁾ are the passes leading to the inland plateau.

The coastal escarpment goes on along shore through Kang-uön Do as far as Ko-syöng, where it is cut short at Chyang-chyön Bay

1) 東大山.

4) 迎日灣.

7) 十里峴.

2) 鹽浦.

5) 寧海.

8) 廣峙.

3) 蔚山.

6) 蔚珍.

near the Mid-sea Diamond Mountains. The *pass of Tai-koal-lyöng* west of Kang-neung is the ascent to this edge, and I was in the habit of noting down in my diary the whole coastal ridge by this name. It, however, lowers at the north of Syöl-ak-san¹⁾, becoming again steep and high at the before-mentioned Diamond Mountain, whose maritime escarpment is nothing more than this ridge. The coves of Ul-san and Chyang-chyön are the two inlets at both ends. There is a space left, 4-8 kilometers wide, between the ridge and the shore all along the harbour-less coast. This long belt of 400 kilometers is a low hilly foreland, excepting in the Sam-chhyök²⁾ district where it is rocky, as the Syo-Paik-san ends at the sea.

The Kang-uön Do portion, north of Kang-uön was in former times called the land of Yöi³⁾ or barbarians⁴⁾, at later times the name was changed to Myöng-jyu⁵⁾ or the Maritime province. There is no other part of the peninsula the past history of which is so little known as that of this poor, obscure district, and this is solely due to its peculiar geographical situation. The only easy way that leads to the maritime region from the interior is the one going up along the Ku-mi Gang⁶⁾, an upper tributary of the Han river, from the general magisterial town Chhyun-chhyön⁷⁾ via In-työi⁸⁾.

iii. *Inland ridge.*—This is one of the elements of the triple structure of the Thai-Päik-san, and the line of dislocation marks the western limit of the mountain, throwing down the *west* side to a lower level. The said line runs nearly through the middle of Kyöng-syang Do, and creates the meridional basin of the Nak-tong Gang, the western elevation being the often-cited Syo-Päik-san ridge on the boundary of the province. Though the scarp has no pronounced

1) 雪岳山.

2) 三陟.

3) 穆國.

4) The Koreans are calling savages *Orangkai*.

5) 溟州.

6) 九棍江.

7) 春川府.

8) 麟蹄.

effect on the step-land scenery as in the case of the sea-board ridge, yet I believe I have seen many knife-cut edges during my traverses across the interior plateau, 300 meters high.

The Inland Ridge seems to start from Kō-chyōi¹⁾ in the southern archipelago, and crossing a channel to Thyōn-chǎ-bong²⁾ of Ung-chh-yōn³⁾ it passes over the deflected course of the Nak-tong Gang at Sam-rang-jin⁴⁾. Then it goes by Mil-yang⁵⁾ and Chǎ-in⁶⁾, and Ha-yang⁷⁾ and Eui-syōng⁸⁾, at the last village I saw this low but sharp ridge of green tuff and red shale, having the appearance of quite a fresh dislocation. The ridge is seen also east of Pong-hoa⁹⁾ in the granitic Thai-Pǎik-san region, and after deflecting to the west it penetrates into the little known area of Paleozoic terrane of the upper Han river. I have crossed it at Tai-hoa¹⁰⁾ on the Tai-koal-lyōng road, and it passes west of In-tyōi which is located in a depression between this and the Median ridge. Again I have crossed the same ridge midway between Chhyang-do and the Diamond Mountain at Kan-bal-ko¹¹⁾, where it trends N. 30° W., and terminates at the entrance of Wōn-san harbour.

Another ridge of similar structure, lying to the west of the above-named, seems to begin at the head of Ma-san-pho¹²⁾, and proceeds by Chhil-ūn¹³⁾, Yōng-san¹⁴⁾, Hyōn-phung¹⁵⁾, Chhil-kok¹⁶⁾, and Pi-an¹⁷⁾, along the east side of the Nak-tong Gang. This should be called the Ma-san-pho Ridge.

-
- 1) 巨濟島.
 - 3) 熊川.
 - 5) 密陽.
 - 7) 河陽.
 - 9) 奉化.
 - 11) 干發告.
 - 13) 漆原.
 - 15) 玄風.
 - 17) 比安.

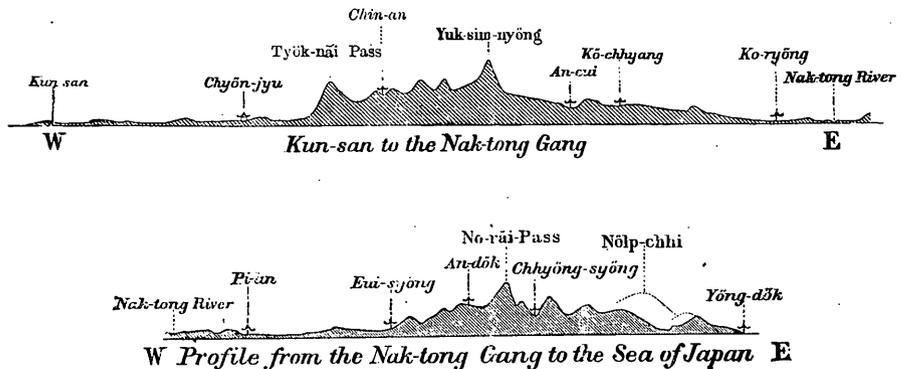
- 2) 天子峰.
- 4) 三浪津.
- 6) 慈仁.
- 8) 義城.
- 10) 大和.
- 12) 馬山浦 or 馬浦 (Mapho).
- 14) 靈山.
- 16) 漆谷.

There are still *two other ridges* of similar structure and the same orientation, but of short extent, and topographically insignificant. They all lie on the *west side* of the Nak-tong Gang.

So much for the ruptured ridges which constitute the Thai-Päik-san Mountains.

β) THE SYO-PÄIK-SAN RANGE.

The Korean System in South Korea comprises a considerable number of ridges which, so far as they have come under my observation, are all of tectonic blocks, and are separable into two groups. I have already given characteristics of a group which is provisionally called the Thai-Päik-san Range. As will be seen in the foregoing pages, the approximate trend of its members is N.N.W. to S.S.E., conforming to the general form of the coast of southern Korea, which form has an intimate genetic relation to the direction of the mountains.



Scale 1:750,000. Vertical $\times 2$.

Figs. 1 and 2.—The two are really a continuous profile of the Han Land or South Korea from the west to the east across Chhyung-chhyöng Do and Kyöng-syang Do, traversing on the way the Syo-Päik-san Range from Työk-nai Pass to Yuk-sim-nyöng (690 m.) in the above, and the Thai-Päik-san Range between Eui-syöng and Yöng-dök in the lower figure. The Syo-Päik-san in Fig. 1, marks the boundary of two provinces, forming at the same time the watershed between the Keum-Gang and the Nak-tong-Gang, the former discharges its waters to the Yellow Sea at the free port of Kun-san, the latter empties into the sea near the Japanese colony of Fusan.

The one, now under consideration, is distributed in the middle of the peninsula, and is usually designated the *Syo-Päik-san Range*. It has already been spoken of in connection with the No-ryöng fold which it cuts off, and farther north it seems in turn to have been intersected by the Thai-Päik-san members. About the last point, I am in some doubt, for, my route did not traverse the mountainous part of Sam-chhyök on the east coast to Thai-Päik-san, nor to Chyöng-syön¹⁾ over the pass of Päik-pong-nyöng²⁾.

It was said that there the mountains were rough and ponies could scarcely be employed at that time. Consequently my personal knowledge unfortunately does not enable me to give details as to how the Thai-and Syo-Päik-sans intersect each other, and as to which took the active part. It is, however, likely that it is the latter that was severed in its north-easterly course by the former.

I do not even know whether the Syo-Päik-san in this region is a fold-ridge, or a tilted edge of Paleozoic formation. Judging, however, from the structure seen at Tyo-ryöng³⁾ and I-hoa-ryöng⁴⁾ (520 meters) on the high way between Seoul and Fusan, we shall probably see at the junction the Syo-Päik-san in the first form. The pass of Tai-chyung-nyöng⁵⁾, 500 meters high, between Tan-yang⁶⁾ and Phung-geui⁷⁾ exposes a granitic base capped by a Paleozoic bed of slate and limestone dipping to the northwest, and shows the igneous rock to be of a laccolitic nature. Syo-Päik-san in a narrow sense is really the edge of this Paleozoic complex of the Chyung-nyöng pass.

A large triangular area of granite, which the Koreans call the Thai-Päik-san region, is situated at the inner angle of the Thai-and Syo-Päik-sans. Analogous cases are frequently mentioned in geol-

1) 旌善.
4) 伊火嶺.
7) 豐基.

2) 白復嶺.
5) 大竹嶺.

3) 烏嶺.
6) 丹陽.

ogical literature, and granite and other eruptives are apt to seek their way to such geologically weak points.

i. *Hoang-chhi Ridge*.—This begins probably at Phyöng-san-pho¹⁾ in Nam-hăi Island²⁾ in the Southern Archipelago, and passing the narrow channel of No-ryang³⁾ to the peninsula proceeds northwards through the passes of Hoang-chhi⁴⁾ west of Chin-jyu⁵⁾, Chhyöng-möri-kokăi⁶⁾ (360 m.) east of San-chhyöng⁷⁾, then Koan-bin⁸⁾ (750 m.) west of Ko-ryöng⁹⁾, terminating in the isolated castle mount of Keum-mu¹⁰⁾. It is the *easternmost* of the members, marking the boundary of gneiss-granite and the Permo-Triassic formation.

The scarp is no doubt due to faulting, the dislodged part of gneiss dipping against the wall, as in the case of the coastal ridge of the Thai-Păik-san. Though not a very high ridge, yet its sharp escarpment is clearly visible from the top of Chhyöng-möri-kokăi. The wall-like precipice beyond the rolling hills (on an average 70 meters) of the Permo-Triassic region seen from the east bank of the Nak-tong Gang, is the one we have just traced. It is the landmark of this region.

ii. *The Phal-hyöng-chhi Ridge*¹¹⁾.—Next to and lying to the west of the preceding, the ridge runs through the small peninsula of Yö-syu¹²⁾, the Pan-syöng pass¹³⁾ and the grotesque Ök-kul-bong¹⁴⁾, of Koang-yang¹⁵⁾. Beyond the Syöm-jin Gang¹⁶⁾ it enters the highest Chiri-san¹⁷⁾, then the Phal-hyöng-chhi pass (430 m.), Hoang-syök-

-
- | | | |
|---|---------|-----------|
| 1) 平山浦. | 2) 南海鳴. | 3) 露梁. |
| 4) Hoang-chhi or Hoang-tai-chhi (黃峙 or 黃大峙), 280 m. high. | | |
| 5) 晉州. | 6) 尺首峴. | 7) 山淸. |
| 8) 勸寔. | 9) 高靈. | 10) 金無山城. |
| 11) 八兄峙脈. | 12) 麗水. | 13) 盤城峴. |
| 14) 億賓峯. | 15) 光陽. | 16) 蟾津江. |
| 17) 智異山. | | |

san¹⁾ of Kō-chhyang²⁾, finally being cut short at Tök-tai-san³⁾ near the Chhyu-phung-nyōng pass. This is the highest ridge and forms the boundary of two provinces.

At the recess and foot of Chiri-san several pagodas are found, one of them being Ssang-gyōi-sā⁴⁾, and the intermontane valleys are infested with hordes of hungry bandits. The Chiri-san region, presenting the characteristic granitic scenery, is one of the *four celebrated mountains in Korea*, that are adorned with pagodas, the other three being Ku-uōl-san⁵⁾ of Hoang-hăi Do, Hyang-san⁶⁾ of Phyōng-an Do, and the oft-mentioned Diamond Mountains of Kang-uōn Do, all granitic mountains.

The massives, lying to the east of this axial ridge, people call the Chiri-san of Kyōng-syang Do, and the opposite the Chyōlla Do Chiri-san. The axial ridge turns its fault-scarp to the east. If we compare this with the Median ridge of the Thai-Păik-san, the Hoang-chhi ridge should be placed parallel with the coastal ridge. Through the undulating hilly land goes a road from San-chhyōng to Chi-ryōi⁷⁾ through An-eui⁸⁾ and Kō-chhyang. It is remarkable to find that this comparatively easy, intermontane highway is not recognized by any except by the natives. It goes along the foot of the inner ridge parallel to the course of the middle Nak-tong Gang, though we have to cross several hill necks of naked, decomposing granitic rocks.

iii. *The Yuk-sim-nyōng Ridge.*—Again the ridge starts from the headland of Heung-yang⁹⁾, and passing the passes of Pul-chhi¹⁰⁾ (320 m.) and Chyōn-san¹¹⁾ of Nak-an¹²⁾, Pam-chhi¹³⁾ and Yō-uōn-chhi¹⁴⁾ (435 me-

1) 黃石山(東門山).

4) 雙溪寺.

7) 知禮.

10) 火峙.

13) 栗峙.

2) 巨昌.

5) 九月山.

8) 安藏.

11) 金錢山.

14) 女院峙.

3) 德大山.

6) 妙香山 or 香山.

9) 興陽.

12) 榮安.

ters) of Nam-uön¹⁾, Yuk-sim-nyöng²⁾ (690 m.), Tög-yu-san³⁾ and then Pu-hang-nyöng⁴⁾, it finally comes to end at Chik-chi-san⁵⁾ near the Chhyu-phung-nyöng pass. In its northern prolongation it forms the boundary ridge of two provinces, and Tög-yu-san, its highest point, is frequently mentioned by native geographers. The steep side of the ridge by this time lies on the west in contrast to the two preceding ridges; consequently this together with the axial ridge forms a sort of crust-block or *Horst*, similar in structure to the Thai-Päik-san. A narrow table of Un-bong⁶⁾, 370 m. high, lies between the ascents of Yö-uön-chhi (west) and Phal-hyöng-chhi (east side).

iv. *The Pi-hong-chhi Ridge.*—This westernmost member starts from the head-land of Thyön-goan-san⁷⁾, and advances by Să-chă-san⁸⁾ Kamnamu-chhi⁹⁾ (150 m.), Tong-pok¹⁰⁾, the Pi-hong-chhi pass¹¹⁾ (215 m.) of Nam-uön, the Pha-kokăi¹²⁾ (310 m.) of Chin-an¹³⁾, ending at the same point as the preceding.

The ridge is like in structure to its eastern neighbour, and between them is situated the depression of Nam-uön.

The foregoing four members, as has been already stated, converge to the Chhyu-phung-nyöng pass where the apex of the gigantic Chiri-san wedge lowers to 200 meters, and the said pass affords an easy passage from the north to the south. The point is just midway of the projected Fusan-Seoul Railway. To the *feather-structure* of these ridges, I shall come back in later pages.

c. THE HAN-SAN RANGE.

Putting aside the Kai-ma Land as an exception, Korea is not a

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- | | | |
|-------------------|---------|--------|
| 1) 南原 | 2) 六十嶺 | 3) 德裕山 |
| 4) 釜項嶺 | 5) 直指山 | 6) 雲峰 |
| 7) 天冠山 | 8) 獅子山 | 9) 柿峙 |
| 10) 同福 | 11) 飛鴻峙 | 12) 波峙 |
| 鎮安 ¹³⁾ | | |

very high mountainous country, nevertheless we find mountains every where. It is topographically speaking a labyrinth, and one will find orientation very difficult in the country without the help of good maps. The general disposition of the land is like a checker-board ; this being due to the crossing of mountain-directions. *I have already enumerated about 10 ridges of the Korean System, all running more or less north-south, terminating in head-lands, peninsulas and islands in the Southern Archipelago.* As instances of these southerly projecting points may be mentioned Ta-thai-pho near the mouth of the Nak-tong Gang, Kö-chyöi and Nam-häi Is., the peninsulas of Yö-syu and Heung-yang, the head-lands of Thyön-goan-san and Tai-dun-san¹⁾, and lastly, the island of Chin-to²⁾ at the south-west corner of Korea. The last-named island marks the boundary of the Southern and Western Archipelagoes, and divides the waters of the Yellow Sea from those of the Nam-häi or South Sea.

Any one, coasting round the archipelago, will readily notice where the *Yellow Sea begins by its turbid and yellow colour.* This peculiarity arises apparently from complicated causes. Swift currents, shallowness of the waters near the coast and great differences in tidal height* are the principal factors which stir up the water and make it muddy.

1) 大屯山.		2) 珍島.		
* Spring-tide. Neap.		Spring-tide. Neap.		
	Mouth of the Tai-dong Gang...21½ft. 15½ ft.		Chyang-ching-no harbour11½ ft. 7½ ft	
West coast.	Chyang-san-kot14 10½	South coast.	Teung-nyang Bay.....13¾ 8¾	
	Mouth of the Han Gang34 —		Port Hamilton11 —	
	Che-mul-pho29¾ 24½		Yö-chä Bay13¾ 8¾	
	Su-chhyök Group16 10¾		Yö-syu Bay12¾ 7¾	
	Na-jyu Group.....13 9½		Tha-ryang Ferry10 6½	
	Great Heuk-san-to Group10¾ 4		(Sea of Han-san-to)	
	Mok-pho14 10		Kö-chyöi Is. (east coast) 6½ 4½	
	Chin-to Is.14¾ 9¾			
	Maru Gulf15 9½		East coast.	Fusan 7 —
	So-an-do, Group10¾ 7½			Gen-san 1½ —
		Syö-syu-ra Anch3-4 —		
		(Tuman Gang)		

Corresponding to these *outcurves* of coast-lines, we have numberless *coves, inlets and bays*, the principal of which, counting from the east, are the following :—The twin bays of Chin-hăi and Ma-san-pho, north of the Kō-chyōi Is., the Sea of Han-san-to, the Bay of Yō-syu receiving the water of the Syöm-jin Gang, the incurves of Yō-chă¹⁾ and Teung-nyang²⁾ on the east and west sides of the Heung-yang peninsula, the harbour of Chyang-ching-no³⁾, and lastly, the Gulf of Ma-ru⁴⁾ or Washington. So numerous are the islands and islets here that I can scarcely enumerate them.

The complexity of the southern coast is the joint-result of the mountain-building of the Korean and the Han-san Systems ; of the latter I shall now speak somewhat in details.

Broadly speaking, the *System* stretches E. N. E., sometimes due east, and even bends a little to the south. There seems to exist a great number of ridges, all being the edges of dislocation, in South Korea. The earth-movement here took place on a less grand scale than in the case of the two preceding systems, so as to give a pronounced effect on land-physiognomy. I will select a few principal instances:

i. *The Pam-chhi Ridge.*—This is a somewhat irregular ridge starting from the north of Koang-jyu, and crossing the upper Syöm-jin Gang near Kok-syōng. The Pam-chhi pass between Nam-uön and Ku-ryōi⁵⁾ is its typical scarp facing the Nam-uön depression of erosion (50 m). It then pursues a north-easterly course to the south of the Phal-hyōng-chhi pass and Ham-yang, whence it can be traced as far as Koan-bin. A new scarp begins at the south of Ham-yang, trending south-eastwards cutting Chiri-san on the north; and San-chhyōng is situated at its north foot, hence the place was formerly called San-eum or the Moun-

1) 汝自灣.

2) 得頓灣.

3) 長直路 or Sin-ji-do (新知島)

4) 馬路.

5) 求禮.

tain-shadow. A river flows through a gorge of the ridge near that place toward Chin-jyu. Chiri-san viewed from the north is majestic.

ii. *The Neung-jyu Ridge.*—From the Na-jyu plain we see on the south toward Neung-jyu¹⁾ a ridge running eastwards from the celebrated Uöl-chhyul-san²⁾ of Yöng-am³⁾ with a precipice facing us like the preceding. For a while it is lost in the hilly land of Tong-pok⁴⁾, reappearing near the Chan-syu⁵⁾ ferry of Ku-ryöi. It then crosses the Syöm-jin Gang at the north of Ha-dong, and proceeds north of the Hoang-chhi toward the south of Chin-jyu and Chin-häi. The *middle Syöm-jin Gang is deflected to an easterly course by this ridge.* The road goes along its northern foot between Chin-häi and Chin-jyu in Kyöng-syang Do, and between Ku-ryöi and Na-jyu viâ Tong-pok.

iii. *The Pyöng-yöng Ridge*⁶⁾.—This begins at Häi-nam and goes along the north of Kang-jin⁷⁾, Chyang-heung⁸⁾, Po-syöng⁹⁾, Nak-an¹⁰⁾ and Syun-thyön¹¹⁾ (Sol-chhi¹²⁾, 240 m.), Koang-yang¹³⁾ as far as Ko-syöng¹⁴⁾, after traversing the Syöm-jin Gang and the Sä-chhyön¹⁵⁾ inlet. The fault scarp by this time faces *south*, and though it is not a high one, it marks the water-parting on the south-coast. A tolerably *fair road* is constructed between Syun-thyön and Häi-nam along the south foot of the ridge.

Still *other ridges of similar structure and parallel orientation* are seen, one along the coast and the other through the Chyang-ching-no islands¹⁶⁾, Heung-yang, Yö-syu, the islands of Nam-häi and Kö-chyöi.

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|-----------------------|---------|---------|
| 1) 綾州. | 2) 月出山. | 3) 靈岩. |
| 4) 同福. | 5) 潺水. | 6) 兵營. |
| 7) 康津. | 8) 長興. | 9) 寶城. |
| 10) 樂安. | 11) 順天. | 12) 松峙. |
| 13) 光陽. | 14) 固城. | 15) 泗川. |
| 16) 長直路 or Sin-ji-do. | | |

In Kyöng-syang Do, I could trace many ridges of this system, sometimes dislodged towards the south, sometimes toward the opposite side. *One* of these runs north of Chin-häi¹⁾ and Ung-chhyön, after passing over the narrow inlet of Ma-san-pho, with its precipitous wall towards south. The *second* ridge trends eastwards between Chhil-uön²⁾ and Chhyang-uön³⁾, and then to the north of Kim-häi⁴⁾. It crosses the Nak-tong Gang at the fortified gorge of Kkachhi-uön-koan⁵⁾, ending at the sea near Keui-jyang⁶⁾. Its steep side is on the north, and to it is entirely due the *remarkable angle of the Nak-tong Gang at Yöng-san*⁷⁾. The *third* lies on the north of the angle between Mil-yang⁸⁾ and Chhyöng-do⁹⁾, and passes through the Un-mun-nyöng¹⁰⁾, and then Mal-li-syöng¹¹⁾ between Ul-san and Kyöng-jyu. The *fourth* stretches to the north of the town Tai-ku at the granitic mountain of Phal-kong-san¹²⁾. I have still to mention the Mo-chä-san¹³⁾ ridge in the plateau (300 m.) of Yöng-chhyön.

I have grouped together all these fault-scarps and ridges under the Han-san Range, by which the peninsular block has been successively dislodged southward, thus limiting the south border of Korea. Small peninsulas, head-lands, islands, islets and rocks are only the detached masses and fragments with skeletal ridges of the Thai-Päik-san and Han-san ranges. Hundreds of these fragments abound in the South Korean Archipelago.

The Han-san Range is *younger* than the two preceding, *viz.*, the

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|----------|----------|----------|
| 1) 鎮海. | 2) 漆原. | 3) 昌原. |
| 4) 金海. | 5) 鶴院關. | 6) 機張. |
| 7) 靈山. | 8) 密陽. | 9) 清道. |
| 10) 雲門嶺. | 11) 萬里城. | 12) 八公山. |
| 13) 母子山. | | |

Sinian and the Korean, and moreover, I believe it is the *youngest* of all the mountain-ranges met with in the whole of Korea.

What the real position of this system is in relation to those prevailing in Japan and China, I am not able to tell. The western half of Hondo (Japan) seems to have been greatly influenced by this system. In the interior of South China it seems to have some connection with the low series of mountains which decides the *lower course* of the Long River. These low ranges are probably members neither of the Kuen-lun, nor the Sinian. We lack a detailed knowledge of these low *basin-ranges* of the Yang-tze-Kiang.

B. THE KAI-MA LAND.

North Korea, as I have already stated, is divisible into two regions, *viz.*, the plateau of Kai-ma on the north, and the hilly land of Paleo-Chyo-syön on the south. The boundary between the two is sharply marked. The north is a *high plateau* with a fault-scarp, facing southwards towards the depressed land, just as the Great Khingan (Hsing-an) turns to the east with its precipice towards Manchuria. The incurves of Korea Bay on the west and that of Chyo-syön Bay (Broughton Bay) on the opposite side give some idea of the boundary as expressed in coast-lines, and we can trace it in the interior as well.

The *natural limit* is so distinctly marked that in 1033, Tök-chong¹⁾, the ninth king of Ko-ryö, ordered his subject Yu-syo²⁾ to build a stone-wall, 25 feet high and thick, across the peninsula so as to check the incursions of *Nüchêns*³⁾ and *Chitans*⁴⁾ from the Manchurian

1) 德宗.

3) 女眞.

2) 柳韶之長城 ("the Great Wall of Yu-syo").

4) 契丹.

frontier, perhaps after the model of the *Great Wall* of China, constructed B.C. 220 by Shi-hwang-ti¹⁾ of the Tsin²⁾ dynasty to ward off the inroads of *Huing-nu*³⁾ from Inner Mongolia. It is stated⁴⁾ that the so-called Wall of Yu-syo begins at Yong-man⁵⁾ at the mouth of the Am-nok Gang and crosses through Wi-jyu⁶⁾, Un-san⁷⁾, Heui-chhyön⁸⁾, Yöng-uön⁹⁾, Mäing-san¹⁰⁾, Yo-dök¹¹⁾ of Yöng-heung¹²⁾, finally reaching the Sea of Japan at In-pho¹³⁾ in the Ham-heung¹⁴⁾ district.

During my journey I saw no continuous wall which might be looked upon as the ruin of this fabulous engineering-work; but I frequently passed strong stone-gates at strategically important points, such as at the foot, and on the passes of mountains. On the highway to China I have passed the double-roofed gates of Syö-rim-chin¹⁵⁾ and Tong-nim-chin¹⁶⁾ on the south of Wijyu, on the passes of Ö-jä-ryöng¹⁷⁾, and Chhya-ryöng¹⁸⁾ in Un-san, and Työk-yu-ryöng¹⁹⁾ in Heui-chhyön,—all in North Phyöng-an Do. Likewise there are many such in North Ham-gyöng Do. The Koreans seem to have availed themselves of the natural defence of the mountain-ridges, and to have fortified only the most important points. The Koreans were and are still very nervous because of their past sufferings. They have to fear enemies from both north and south. From the latter they have to guard against the encroachments of the Japanese. Travellers will see the towns fortified from Kang-uön Do all along the south coast,

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|---|----------|----------|
| 1) 始皇帝. | 2) 秦. | 3) 匈奴. |
| 4) in Ko-ryö-sä (高麗史). | | |
| 5) 龍灣 (a name given to the mouth of the Am-nok river or Ya-lu-kiang). | | |
| 6) 義州. | 7) 雲山. | 8) 熙川. |
| 9) 寧遠. | 10) 孟山. | 11) 耀德. |
| 12) 永興. | 13) 麟浦. | 14) 咸興. |
| 15) 西林鎮. | 16) 東林鎮. | 17) 於自嶺. |
| 18) 車嶺. | 19) 狹隘嶺. | |

and in these intermural hermit-towns the people seek in vain a peaceful life.

a. THE LIAU-TUNG RANGE.

The earth-movements that disturbed and uplifted the Kai-ma Land are mainly dislocations and not folds ; consequently the disturbance should be classed in the same category as that which created the Korean and the Han-san systems. *I can without difficulty distinguish three ridges, which run parallel to one another in the Liau-tung direction and constitute the skeleton of this northern plateau.* The two southernmost of these have the steep side towards the south, but it is remarkable that they become successively higher at the tilted edge, when the block is suddenly cut off to a lower level on the south. The tilted edge of this narrow but gigantic block is, as I have already stated, the land-mark of the two halves of North Korea. The third parallel ridge, however, falls away steeply to the north-west ; in consequence of which a comparatively low basin is formed in the drainage-area of the Am-nok and the Tuman rivers, which is limited on the north by the long Chyang-päik-san.

i. *The Myo-hyang-san Ridge.*—We can trace this ridge from Köm-san¹⁾ in Korea Bay on the north of Syön-chhyön²⁾ towards the east through Thai-chhyön,³⁾ and Yöng-byön⁴⁾ across the Upper Chhyöng-chhyön Gang⁵⁾ in Uöl-lim⁶⁾ at the entrance of the famous Myo-hyang-san⁷⁾ until it culminates at Koang-syöng-kokkäi⁸⁾. The ridge within Phyöng-an Do is of moderate height, though presenting a sharp outline ; but after entering Ham-gyöng Do it assumes an imposing appearance, marking the south brink of the Eastern Kai-ma plateau.

1) 劍山.

2) 宣川.

3) 泰川.

4) 寧邊.

5) 清川江.

6) 月林, hence the upper course of the river is named the Uöl-lim Gang.

7) 妙香山 or Hyang-san.

8) 廣城峴.

On the way from Ham-heung to Chyang-jin¹⁾, I made the ascent of one of the passes of this ridge called the pass of Hoang-chho-ryöng²⁾ (1090 m.). I literally climbed up to the summit on a narrow, rocky path running through a deep forest, and one of my loaded ponies lost his foot-hold and fell twice throwing off his load. Midway up we had to make a short descent at which time my horse-drivers caught the ponies by the tail to prevent them from slipping.

The ridge then runs eastwards through Pu-chyöl-lyöng³⁾ and Huchhi-ryöng⁴⁾, being finally cut down by an oblique fault-line at *Tai-uön-san-nyöng* (1375m)⁵⁾. The latter, starting from near the free port of Syöng-jin⁶⁾, proceeds northwards along the coast, penetrating far into the Tuman Gang region, and the northerly curve of this boundary river follows its eastern foot. The new ridge is popularly known as the Chyang-päik-san, but it should rather be called the Small or *Syo-Chyang-päik-san* to discriminate it from the Long-white Mountains of the north. The ridge is the eastern brink of the basalt-plateau of East Kai-ma, and the coast of Ham-gyöng Do from Syöng-jin to Kyöng-syöng follows the course of the mountain, exactly like the Kang-uön Do coast at the foot of the Thai-Päik-san-range. The Myo-hyang-san, after being cut off from the main ridge by the Syo-Chyang-päik-san, still lingers near the coast, keeping its original direction, and raising its head of *geological cliff* within basalt-mesa. It is locally called Kang-neung-san⁷⁾, and ends at Ö-tai-jin-kot⁸⁾ (C. Kozakoff).

The foreland between Syöng-jin and Ham-heung borders the north shores of Chyo-syön Bay. It is a belt of hilly land about 40 kilometers in width, with the precipitous wall (1000 m.) of the Myo-hyang-san on the north. This tract was called in the middle ages

1) 長津.
4) 厚致嶺.
7) 江陵山.

2) 黃草嶺.
5) 大元山嶺.
8) 漁大串.

3) 赴戰嶺.
6) 城津.

Kal-lan¹⁾, and the high *hinterland* the Sol-bin²⁾ Land, the latter approximately coinciding with the often-mentioned East Kai-ma. The only highway to Vladivostok runs along the coast where one must cross the Ham-koal-lyöng³⁾, Ma-ul-lyöng⁴⁾, and Ma-thyöl-lyöng⁵⁾ between Ham-heung and Syöng-jin. These *three passes* are on independent ridges which go through East Kai-ma, and probably also through the Upper Sungari in the Trans-Chyang-päik Mountains. *Their directions approximately coincide with the general trend of the Thai-Päik-san ; but I believe their upheaval dates far back in time as compared with the mountains of South Korea.*

ii. *The Työk-yu-ryöng Ridge.*—Starting at about the same point as the preceding with similar geologic structure and approximately in parallel orientation, this ridge passes through Yöng-kol-san⁶⁾ and Syö-rim-chin⁷⁾ (100m.), the above-mentioned O-jä-ryöng (510m.) and Chhya-ryöng (635m.) near the American mines of Un-san, then through Ku-hyön⁸⁾ and Työk-yu-ryöng⁹⁾ (970m.); the last lies on the main road from the southern Phyöng-an Do to Kang-gyöi¹⁰⁾ which is the center of commerce and the headquarters of troops, of the middle Am-nok Gang. Kang-gyöi is comparatively speaking a busy town and claims an important commercial position in northern Ham-gyöng Do, as Hoi-ryöng¹¹⁾ does for the upper Tu-man Gang. In East Kai-ma Land the ridge forms Yön-hoa-san¹²⁾ and Syöl-mäi-ryöng¹³⁾ (1,400m.) of Chyang-jin¹⁴⁾, apparently becoming lower towards the Sam-syu¹⁵⁾ district.

1) 曷懶.

2) 率濱.

3) 咸關嶺.

4) 摩雪嶺.

5) 摩天嶺.

6) 龍骨山.

7) 西林嶺.

8) 狗峴.

9) 狄踰嶺.

10) 江界.

11) 會寧.

12) 蓮花山.

13) 雪梅嶺.

14) 長津.

15) 三水. or Three Waters, so named as it lies in the region at the junction of the Am-nok, Hō-chhyön and Chyang-jin rivers.

I do not know its eastern prolongation as it is hidden in the impenetrable forest of basalt-mesa on the upper course of the Tu-man Gang. We see in the hilly land of Yuk-chin¹⁾ a ridge running north-eastwards from Pu-ryöng to Ung-geui-pho²⁾ (Audacious Cove). This is the *Chhyöng-bahoi*³⁾ ridge, and may be looked upon as a continuation of the long Työk-yu-ryöng Ridge.

iii. *The Kal-eung-nyöng Ridge*.—The third and the last ridge of the Liau-tung direction in the Kai-ma Land bounds the hydrographic basin of the Am-nok and Tu-man rivers on the south, from which the uplifted block descends slowly in the undulating folds of gneiss. The ridge can not be recognized as such from the plateau, but is easily seen from the basin-region.

The ridge proceeds from Ok-gang⁴⁾ on the Am-nok Gang through Mang-nyöng⁵⁾, Oan-hang-nyöng⁶⁾ (640m.) of Chhyang-syöng⁷⁾, Sam-chhãi-ryöng⁸⁾ (810m.) of Chho-san⁹⁾, and passes over the gorge of Syang-chhyöng¹⁰⁾ on the south of Kang-gyöi. Then it touches the pass of A-deung-nyöng¹¹⁾ between Kang-gyöi and Chyang-jin, and continues to Kal-eung-nyöng¹²⁾, crossing the upper Am-nok river at

1) The low mountainous tract at the north-east corner of Ham-gyöng Do, partially enclosed by the outcurve of the Tu-man Gang, is popularly called Yuk-chin (六鎮地方). The region was the source of troubles under the Ku-ryö dynasty. The *Orangkais* (兀良哈) or *Yö-chin* (Nüchên 女真) barbarians often made inroads into this side of the Tu-man Gang from their home, lying between Chyang-pãik-san and Hei-lung Kiang (the Amur), sometimes incorporating Ham-gyöng Do in their own domain. Syöi-song, the fourth King (1418-1449) of the present dynasty, recovered all that had been lost and established six military stations or *chins* along the great curve of the Tu-man Gang. They are Kyöng-heung (慶興), Kyöng-uön (慶源), On-syöng (穩城), Chyong-syöng (鍾城), Hoi-ryöng (會寧) and Pu-ryöng (富寧). At a later time Mu-san (茂山) was added to them. Hence the region within the outcurve of the river and Kyöng-syöng (鏡城) is designated *Yuk-chin* or Six Military Stations. At remote times it went under the name of Mãi-ku-ru (買溝婁).

2) 雄基浦.

3) 青岩 or *blue rock* is a vertical reef, running across the river-bed, 5 kilometers south of Pu-ryöng. It is a dyke-rock in gneiss-granite oriented in the same direction as the trend of the ridge. The rock is a red, compact quartz-porphry and *not a blue* one.

4) 玉江.

5) 幕嶺.

6) 綏項嶺.

7) 昌城.

8) 三綵嶺.

9) 楚山.

10) 尙滑.

11) 牙得嶺.

12) 吧靈嶺.

Chhyung-thyöl-lyöng¹⁾, where the Duck's Green river makes a deep gorge. In its further course I know nothing about it, though the already-mentioned *Chhyöng-bahoi* ridge in Yuk-chin indicates some connection with it in regard to the orientation of mountains.

At the north-east corner of Ham-gyöng Do, in the so-called Yuk-chin district which comes in direct contact with the Russian Littoral territory, is a ridge which I have already mentioned—the Chhyöng-bahoi. There are still two others worthy of mention which I recognized during my journey there.

a) One sharp ridge—the *Mu-san-nyöng*²⁾ with south scarp comes from the famous Päk-tu-san in almost equatorial direction through Mu-san, and the Mu-san-nyöng pass; the latter lies between Hoi-ryöng and Pu-ryöng. In its further course it goes through Chyön-nyöng³⁾ and just before Kyöng-heung crosses the Tu-man Gang to the east at the boundary of Manchuria and Primorsk.

b) The other ridge—the *Chyang-ji-bong*,⁴⁾ of the same geologic structure, runs on the north side of the Tu-man Gang in the neutral district of Kan-to,⁵⁾ and crosses the meridional course of the river at the north of Hoi-ryöng, culminating at Chyang-ji-bong near Hang-

1) 衝天嶺.

2) 茂山嶺.

3) 檜嶺.

4) 長支峰.

5) We were accustomed till a few years ago to see on the maps of China a long belt of neutral territory on the west of the Am-nok Gang, and the Korean Gate in the palisade near Föng-hwang-tchön marked the true eastern limit of South Manchuria. At present this territory is *in actu* absorbed by China and has disappeared forever from the map. The Duck's Green river forms now the international boundary. This side is inhabited by the white-clothed Koreans, the opposite side by the blue-clothed Chinese.

We have still a relic of such a territory in the region of the ten-thousand waters. Near On-syöng one finds a great tributary river joining the Tu-man Gang. This rises in Päk-tu-san, and in its course receives the name Hái-ran-ha (海蘭河) or the Boundary river. On its north side is the high basaltic plateau of Kirin. The basalt-mesa lying between this river and the Tu-man Gang embraces an extensive area, 120 kilometers long and 60 kilometers wide, and equals in size that of Yuk-chin. This region is called the *Intervening Island* or *Kan-to*, and in former times it was entirely without inhabitants and was kept strictly as a neutral territory. Lately, however, under the pressure of the Russian advance toward the south the Chinese and the Koreans have settled there and are living together; so trouble often arises between the two countries as to the government of its inhabitants.

yöng, the headquarters of Yuk-chin. It then crosses again the river at the north of Kyöng-heung, apparently ending on the south side of Possiet Bay in the Russian dominion. A Russian military station, Savlofka, lies at the foot of the ridge on the north side of the river just opposite Kyöng-heung.

The road from Kyöng-heung to Hoi-ryöng across Yuk-chin goes between the two ridges, and the course of the Tu-man Gang is for a short distance deflected on the south foot of this ridge, corresponding to both arms of the U-shaped outcurve of the Tu-man Gang.¹⁾

A glance at the structural lines of the north border of the peninsula, will lead one to conclude that the above-mentioned ridges converge or rather approach each other near the mouth of the Tu-man Gang. Ranges of the Kai-ma Land trend E.N.E., while those of Yuk-chin run nearly due east. I here wish to call particular attention to the fact that the latter are in the *Chyang-päik-san* direction in contrast to that of the Liau-tung.

F. v. RICHTHOFEN's geologic map of Liau-tung shows structural lines analogous to those of my field, and both form, indeed, a geologic unit. Moreover, a recent journey of E. v. CHOLNOKY²⁾ disclosed another ridge with the E. W. trend near San-tao-kou, which, I believe, lies further north of the Chyang-päik-san, apparently with the same structure as in my field. He says that the geologic line cuts through Tung-hoa-hsien and reappears near Tieh-ling³⁾ in the complex of phyl-

1) *Tu-man* or *to-mun* signifies ten-thousand in the Nüchên dialect; Tu-man Gang, therefore, means ten-thousand waters or a stream having innumerable tributaries. I believe the name originated from the feather-like arrangement of its affluents which flow down from the basalt-mesa of Kai-ma in the upper course of the stream.

2) 'Kurze Zusammenfassung der wissenschaftlichen Ergebnisse meiner Reise in China und in den Manchurei in den Jahren 1896-1898.' *Verhandlungen der Gesellschaft für Erdkunde zu Berlin*. Bd. XXVI, 1899, S. 255.

3) 鐵嶺.

lite, gneiss and gneiss-granite with a northerly dip. The same ridge seems to continue to the other side of the Liau-tung depression at I-wu-lü-shan. This had been asserted a century before by a Korean geographer¹⁾ whose statement is now reaffirmed by Dr. E. v. CHOLNOKY. It seems to me that the further north we go, the younger is the geological event which lifted up the block on the south edge with northerly slant.

The Am-nok-Tu-man Gang basin is in one of these valleys of *compound step-fault*,²⁾ which is at the same time one of the widest. Had not the lava from the Päk-tu-san volcano, the highest point of the Chyang-päk-san, flowed down to the south, and partially filled up the bottom, we should have a comparatively low trench through which an easy path might lead from Possiet Bay to the Angle of Mao-êrh-shan in the upper Am-nok. An elevation which separates the two rivers is the pass of Hyöi-san-nyöng³⁾ whose altitude possibly does not exceed 700 meters. During the Augustine age of the Liau⁴⁾ dynasty (916-1125) their sovereigns yearly sent an expedition through this valley to get falcons from the Lower Tu-man. Hence the way through the two rivers was called the *Falcon road* or *Eung-no*.⁵⁾ It is now entirely forgotten, and, as we see now, the upper Tu-man is a pathless, impenetrable forest. It was not Nature, but man who drove civilization out of this region, and the fact that the region lies near the sacred home of the Manchu dynasties, has greatly contributed to this condition of abnormal retrogression.

1) I-Chyung-hoan. *Vide ante* p. 6.

2) Exactly speaking, the present case is what the miners call the *hading against the dip*, and the *parallel fault planes* are all *inclining in the same sense*.

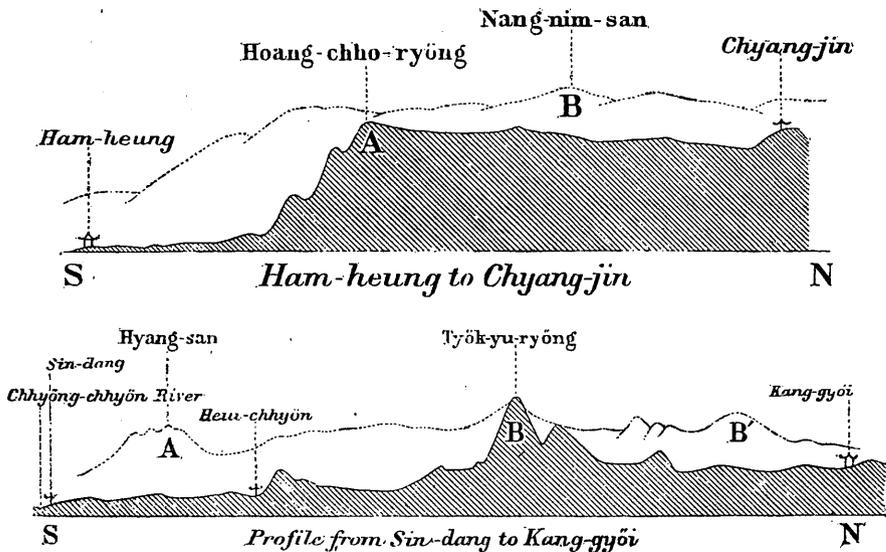
3) 惠山嶺.

4) Liau or Kitans or Cathay (遼).

5) 鷹路.

b. THE KOREAN SYSTEM.

When speaking of the surface-configuration of South Korea, I have said that it is like a checker-board, and the same feature is not wanting in the Kai-ma Land. We have here mainly to deal with the Thai-Päik-san Range. The Kai-ma Land is naturally divisible into two portions. The right side is East Kai-ma or the Sol-bin Land which presents the typical physiognomy of a plateau, especially the part lying between the Hyang-san and Työk-yu-ryöng ridges, with an average-height of 1,000 to 1,200 meters. (Fig. 3.) The water-divide lies in the first ridge. The left side is less typical, on average 600 meters high, and the Työk-yu-ryöng ridge is here the water-parting. (Fig. 4.)



Scale 1:562,500. Vertical $\times 2$.

Fig. 3.—Profile from Ham-heung, the general magisterial town of South Ham-gyöng Do, to Chyang-jin through the pass of Hoang-chho-ryöng (1090 m.), showing the typical plateau-feature of the *East Kai-ma* land. A and B are the Hyang-san and the Työk-yu-ryöng ridges. The Kal-eung-nyöng ridge lies to the north of Chyang-jin.

Fig. 4.—The profile is drawn from Sin-dang, 50 kilometers up the river Chhyöng-chhyön from An-ju, to the inland town of Kang-gyöi through the celebrated Mount Hyang-san and the Työk-yu-ryöng pass. (970 m.) This cross-section shows the much-dissected plateau of *West Kai-ma*. A, B, and B' are respectively the Hyang-san, Työk-yu-ryöng, and Kal-eung-nyöng ridges.

i. *The Nang-nim Ridge.*—An important ridge which separates both Kai-mas, seems to me to be a continuation of the Thai-Päik-san of South Korea. It is the Nang-nim-san¹⁾ ridge with the escarpment toward the west. Nang-nim-san itself, as far I could make out, seems to be a branch of the Työk-yu-ryöng ridge. The Tai-gang-syöm²⁾ peninsula at the entrance of Yöng-heung Bay bridges over Nang-nim with the Keum-gang-san portion of the Thai-Päik-san range. It encloses landwards the inlet of Syong-djyön³⁾ or Port Lazareff. Its northern prolongation is not well ascertained, but as FREIHERR FERDINAND VON RICHTHOFEN suggests⁴⁾, the angle of Mao-êrh-shan,—the sudden turn of the river-course of the Am-nok,—must be ascribed to its presence. Its further course may perhaps be traced in the geologic structure though it may not be apparent in surface-features.

ii. *The Ham-koal-lyöng Ridge.*—In East Kai-ma I have still to mention two other ridges which lie to the east of the preceding and run approximately in the same direction, but with the fallen blocks on the contrary side, consequently presenting sharp scarps toward the east. In both trend and structure, they must be grouped with the Thai-Päik-san range.

The Ham-koal-lyöng ridge, as has been already stated, starts from the gneiss pass of the same name between Ham-heung and Hong-uön⁵⁾. I have crossed it in the eye-gneiss region of Syöl-lyöng (1,565 m.) in the interior. Perhaps in its farther course it meets the Kal-eung-nyöng ridge at the gorge of Chhyung-thyöl-lyöng in the Am-nok Gang.

iii. *The Ma-thyöl-lyöng⁶⁾ Ridge.*—The pass of the same name (600 m.) lies to the west of the free port of Syöng-jin. It is a well-

1) 狼林.

2) 大江島半島 or Nakhimof Peninsula.

3) 松田灣.

4) *Vide ante* p. 5.

5) 洪原.

6) 摩天嶺.

known land-mark which separates the north Ham-gyöng Do from the south. This and the other side are respectively called Nam-koan_{C1} and Peuk-koan²⁾, *i.e.* the south and the north of the gate. I have met with it on the way from Kap-san³⁾ to Kil-jyu⁴⁾, in the form of gneiss (the axis of schistosity N. 30° W., and vertical) in the celebrated gold field in the canyon-like Tai-dong⁵⁾ valley of Tan-chhyön⁶⁾. A geologic cliff by the name of Tu-ryu-san⁷⁾, 2,421 meters high, raising its head from the basalt-mesa, points out the direction in which the ridge runs in the high, lava-drowned flat⁸⁾.

As above stated, I have no local knowledge of the upper Tuman Gang; yet if the line be traced northwards, it would touch the water-divide of Hyöi-san-nyöng and finally reach the volcano of Päk-tu-san. *Should my supposition prove to be right, then the crater would be located at the intersection of the two tectonic lines.*

The *three ridges*, which I have just treated in general outline, have the trend in the Thai-Päk-san direction, yet their peculiar characteristics prevent them from being classed together in the same group. Starting from the magisterial town of Ham-heung, north of Wön-san, toward the pass of Hoang-chho-ryöng, we find ourselves walking upon the ground of a whitish, coarse, *crushed granite* whose schistose axis runs at first in the Sinian direction⁹⁾ (S.W.—N.E.) till the foot of the pass is reached. Then the axis suddenly changes to the Liau-tung direction on the pass. From here to Chyang-jin for a two day's march the *pressed axis of the rock is oriented north-south with westerly trend within a few degrees (less than 20°)*, which coincides with that of the Thai-Päk-san.

1) 南關.

2) 北關.

3) 甲山.

4) 吉州.

5) 大洞 See Pl. II, Fig. 2.

6) 端川.

7) 斗流山.

8) See Pl. II, Fig. 1.

9) It is the Mäing-jyu-nyöng Ridge.

I believe this is the primary structure, as is evinced from extended, black secretionary patches and also excretionary, coarse, tourmaline-bearing aplite. May not this structure have been caused by the active flow of soft rock after the fashion of an ice-sheet, or by a passive movement during the folding of the crust? The two ridges,—the Ham-koal-lyöng and the Ma-thyöl-lyöng,—are no doubt crests of the pressed granite. Between Kap-san and Kil-jyu the compressed rock is overlaid discordantly by phyllite and limestones which are in turn covered by flat basalt-flows¹⁾. From the mode of occurrence of the fundamental rock I am forced to conclude that the crustal movement took place in a very old period, and therefore that it has lost its topographic significance. These ridges should have their prolongation in the Sea of Japan, unless they be cut down to the abyssal bottom by the later Liau-tung ridges.

The meaning of these ridges and of the pressed planes of gneiss-granite in East Kaima is not clear to my mind ; and the difficulty of deciphering their import becomes to me a constant stumbling block in my attempts at reconstructing the geological history of the peninsula.

The geologic axis of the gneiss-granite coincides with that of the Korean system, but it may not be identical with the axis which prevails in the Thai-Päik-san range. F. von RICHTHOFEN²⁾ repeatedly speaks of an old geologic line in Shan-tung, running N.N.W. to S.S.E., and this seems to have something to do with that which I have observed in East Kai-ma. It may perhaps represent the fourth line of W. PRINZ's torsion-course³⁾.

It must be specially remarked that this highly significant line of geologic structure was not noticed in West Kai-ma, excepting in a

1) See Pl. II, Fig. 1.

2) 'Schantung', S. 53.

3) *Annuaire de l'Observatoire Royale de Bruxelles*, 1891.

spot at Chhya-ryöng on the north of the American Mines of Un-san. The said structure seems to prevail mainly to the east of the compound ridge of Thai-Päik-san and Nang-nim, which together form the present back-bone of the Korean Peninsula.

There are *three ridges* of the Thai-Päik-san range in West Kai-ma. As they are inseparable from those in the land of Paleo-Chyo-syön, it will be convenient to treat them in the sequel.

C. THE PALEO-CHYO-SYÖN LAND.

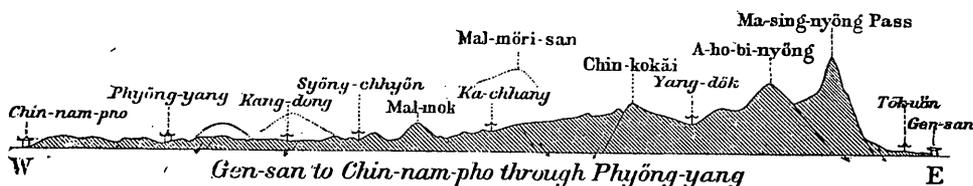
Between the axes of mountains of the Sinian and Liau-tung directions which seem to join in East Kai-ma and Yuk-chin, there is present a wedge-shaped tract of land *inserted* between them, which remained in a neutral state, or rather took a retrogressive movement to the south-west between the two struggling forces. Geologically speaking, it is a folded Sinian land. Lying to the north-west of the trench of Chyuk-ka-ryöng, which separates South from North Korea, this *Intersertal* makes up the southern half of the latter, being bounded on the north by Kai-ma.

Topographically, it is the land of *Mittelgebirge*, diversely crossed by ridges (Fig. 5), averaging less than 300 meters, excepting in the eastern and north-eastern portions, from which the waters flow down to Korea Bay, through the channels of the Tai-dong Gang¹⁾ and the Chhyöng-chhyön Gang.²⁾ As may be seen from their crooked courses, the rivers make their way through nearly reticulated ridges in diagonal directions. Especially the Tai-dong Gang serves for the

1) 大同江, a great-same-stream, or phai-syu (溟水).

2) 清川江.

passage of waters from a great number of tributary rivers on the higher eastern level to the western lowland of Phyöng-yang, which is at the same time the largest inland basin of Korea. The name Tai-dong Gang itself signifies a great confluent stream.



Scale 1:750,000. Vertical $\times 2$.

Fig. 5.—Profile from the free port of Gen-san (Wön-san) to that of Chin-nam-pho in the Yellow Sea through the old capital Phyöng-yang and the high pass of Ma-sing-nyöng (1020 m.). This cross-section shows clearly the *Mittelgebirge* character of the *Paleo-Chyo-syön* land, rising higher as we go eastwards towards the Sea of Japan. The profile goes through the narrowest part of the peninsula; and we have to cross the lengthwise ridges during a traverse from the shore of the Yellow Sea to that of the Green Sea. They are the ridges of the Yuk-chyang near Kang-dong, the Mal-möri, the Chin-kokäi, the A-ho-bi-nyöng and the Ma-sing-nyöng.

A mythic personage, Tan-gun,¹⁾ the father of the Korean kings, came down to the top of Myo-hyang-san, already mentioned, and at first chose Phyöng-yang²⁾ for the capital of the Tan-gun Chyo-syön³⁾ dynasty. This was followed by the Keui-si Chyo-syön⁴⁾ and Ui-si Chyo-syön⁵⁾ dynasties. Their domains embraced the Intersertal and a part of South Manchuria. As the Koreans now call these old dynasties (B.C. 2317–209) collectively Ko-chyo-syön,⁶⁾ I will hereafter speak of the realms of these old kingdoms *the land of Paleo-Chyo-syön*.

The region is mainly built up of granitic rock and grey thinly-tabular limestone, which complex is, geologically speaking, *shattered* into diverse blocks. The downthrows are of nearly the same magnitude, and during my flying visit it was extremely difficult to decide which had the priority and which the supremacy over the other. The results of the shattering are, of course, detached blocks,

1) 檀君.

2) 平壤.

3) 檀君朝鮮.

4) 箕氏朝鮮.

5) 衛氏朝鮮.

6) 古朝鮮. Under the Chinese rule, the region was called *Nang-nang* (樂浪).

but many of these often have slowly undulating *folds*. Perhaps it will be convenient for descriptive purposes to group the fault-ridges into two series—the *lengthwise* and *crosswise* ridges. In the following I shall select and characterize a few of the principal ones.

There are about seven *lengthwise* ridges and an equal number of *crosswise* ones. Counting from the south we have in the *south group* of the latter series the following:—

a) CROSSWISE SERIES.

South Group.

i. *The Syu-yang-san Ridge.*—In the southern Hoang-hăi Do we meet with this ridge with the scarp on the south, which starts from Syu-yang-san¹⁾ near Hăi-jyu²⁾ and reaches Chhi-ak-san³⁾ of Păik-chhyön.⁴⁾ The ridge of gneiss-granite is clearly seen from the south coast, and passes through Syong-ak-san⁵⁾ of Syong-do.⁶⁾ I have crossed it near Sang-nyöng⁷⁾ at the Im-jin Gang.⁸⁾

ii. *The Myör-ak-san Ridge.*—This ridge forms the axis of Hoang-hăi Do with the scarp in the contrary direction, *i.e.* toward the north. Probably coming from Shan-tung, it enters the peninsula at Chyang-san-kot and is prolonged to Myör-ak-san⁹⁾ in Syö-heung,¹⁰⁾ terminating at the brink of the trench of Chyuk-ka-ryöng at Ko-am-san,¹¹⁾ west of Phyöng-gang.¹²⁾ An easy road leads from the latter to Phyöng-san¹³⁾ on the south side of the ridge.

iii. *The Chyo-il-lyöng Ridge.*—This ridge begins from a slate elevation between Hoang-jyu¹⁴⁾ and Chyung-hoa,¹⁵⁾ and passes with a

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- | | | |
|---------|----------|--------------|
| 1) 首陽山. | 2) 海州. | 3) 雒岳山. |
| 4) 白川. | 5) 松岳山. | 6) 松都. |
| 7) 朔寧. | 8) 臨津江. | 9) 滅惡山(綿岳山). |
| 10) 瑞興. | 11) 古庵山. | 12) 平康. |
| 13) 平山. | 14) 黃州. | 13) 中和. |

south scarp through the mica-schist pass of Chyo-il-lyöng¹⁾ (450 meters), on the north of Syu-an,²⁾ ending at the boundary of the province on the top of Päk-nyön-dök.³⁾

The above *three ridges of the south group* all lie in Hoang-häi Do, and trend from W.S.W. to E.N.E., corresponding to the axis of the *Shan-tung Peninsula*. The *north group* of this series, however, runs from W.N.W. to E.S.E., conforming itself to the coast-line between An-jyu and Wi-jyu.

North Group.

iv. *The Hoang-nyong Ridge.*—On the highway northward from Phyöng-yang, at the place called Am-chyöng-näi-uön,⁴⁾ a low elevation of granite-gneiss stretches southeastwards to Ku-Syang-uön⁵⁾ on the way to the British mines of Ap-Eun-san. We meet with its south scarp at Hoang-nyong-san⁶⁾ at the back of Kang-dong⁷⁾ on the way to the east coast. I have crossed it at Mun-hön-kökäi,⁸⁾ but could not trace its eastern course.

v. *The Mal-mok Ridge.*—Beginning again on the highway of Phyöng-yang on the north of Suk-chhyön,⁹⁾ we have to ascend the two low kökäi or passes of Sai-uön¹⁰⁾ and Päm-kökäi.¹¹⁾ The ridge proceeds E.S.E., with a north scarp through Keum-san. At its northern foot is located the Gwendoline¹²⁾ Mine of the British Mining Concession. I have crossed it on its easterly course at Mal-mok-kökäi,¹³⁾ north of Syöng-chhyön,¹⁴⁾ and followed its north foot to Yang-dök¹⁵⁾ in my journey to the east coast.

vi. *The Thyön-syön-san Ridge.*—From An-jyu this ridge runs

-
- | | | |
|--|--------------|---------|
| 1) 朝日嶺. | 2) 遂安. | 3) 百年嶺. |
| 4) 岩赤川院. | 5) 舊祥厚. | 6) 黃龍山. |
| 7) 江東. | 8) 文憲峴. | 9) 龜川. |
| 10) 新院. | 11) 蛇峴(暗雲峴). | |
| 12) The Koreans call the mine Yong-hoa-bang (龍化坊). | | |
| 13) 馬項峴. | 14) 成川. | 15) 陽德. |

parallel to the preceding, but with a south scarp, through Syung-hoasan¹⁾ and Thyön-syön-san,²⁾ the latter is clearly seen from the British mine. I have crossed it at Mi-reuk-kokäi³⁾ (300 m.) on the way to Tök-chhyön.⁴⁾ The ridge probably proceeds toward Wön-san and forms the boundary of Phyöng-an Do and Ham-gyöng Do. A low series of hills belonging to this line, is also observed along the coast, west of the Chhyöng-chhyön Gang which is greatly deflected in its upper course by this ridge.

vii. *The Tu-kai Ridge.*—This is the last and the northernmost of the series, presenting a somewhat anomalous situation in regard to its trend. It runs rather in the Liau-tung direction from Kai-chhyön⁵⁾ eastwards, and I have crossed it at the ottrelite-schist pass of Tu-kai-kokäi⁶⁾, north of Tök-chhyön.

viii. *The Mäing-jyu Ridge.*—This short but remarkable ridge is met with at the east end of the preceding, stretching in the *Sinian* direction. It forms the boundary of Phyöng-an and Ham-gyöng, and also the water-parting between the Chhyöng-chhyön Gang and the east coast. The crushed-granite pass of the Mäing-jyu-nyöng⁷⁾ lies on this mountain, and is one of the principal roads leading from Yöng-heung⁸⁾ to Yöng-uön⁹⁾.

β) LENGTHWISE SERIES.

Corresponding to the seven *crosswise* ridges just mentioned, we have an equal number of *lengthwise* ones which trend in the *Korean direction*, but they can not easily be brought into harmony with the *Thai-Päik-san Range*. They seem in a great measure to determine the coast line of the western shore of Korea. There are four principal and

1) 崇化山.
4) 德川.
7) 孟州嶺.

2) 天仙山.
5) 价川.
8) 永興.

3) 彌勒峴.
6) 斗介峴.
9) 寧遠.

three secondary *lengthwise ridges*, which, when counted from the west, are the following :—

i. *The Ku-uöl-san Ridge.*—From Kang-nyöng¹⁾ in Hoang-häi Do, a ridge runs northwards through Mi-reuk-kokäi²⁾ to Song-ku-san,³⁾ the counterpart of Ku-uöl-san. It reappears in the celebrated gneiss-mountain of Ku-uöl-san⁴⁾ which is tilted up on its east side with a gradual slant to the west. After a short course it disappears in Korea Bay, coming up again at Thyöl-san, whence it follows the east side of the Wi-jyu highway.

ii. *The Chä-mo Ridge.*—Starting from Yön-an⁵⁾ at the mouth of the Han river, this ridge runs parallel to the preceding, and crosses the highway of Phyöng-yang at Köm-syu-yök.⁶⁾ It lowers at the east of Phyöng-yang, becoming again a little higher at Ko-bang-san, and proceeds to An-jyu past the Chä-mo Castle.⁷⁾ In West Kai-ma it goes through the west of Un-san and Tong-chhang,⁸⁾ probably crossing the Am-nok on the west of Pyök-dong.⁹⁾

iii. *The Yuk-chyang Ridge.*¹⁰⁾—Starting at the mouth of the Yöi-syöng Gang,¹¹⁾ this ridge likewise goes northwards, crossing the highway at Chhya-yu-ryöng¹²⁾ and stretching to Yuk-Chyang-kokäi at the boundary of Phyöng-an and Hoang-häi Do. Its northern prolongation may be traced through Kang-dong, Eun-san, and Kai-chhyön.¹³⁾ The northern arm of the Tai-dong Gang flows southward between this and the Chä-mo ridge. In West Kai-ma it passes on the east of Yöng-byön and crosses the Am-nok between Pyök-dong and A-i-jin.¹⁴⁾

iv. *The Mal-möri Ridge.*—This is the most important ridge in the Paleo-Chyo-syön Land. Beginning at Syong-ak and Tai-heung-san¹⁵⁾

1) 康翎.
4) 九月山.
7) 慈母山城.
10) 六將峴.
13) 价川.

2) 彌勒峴.
5) 延安.
8) 東倉.
11) 禮成江.
14) 阿耳鎮.

3) 送九山.
6) 劍水驛.
9) 碧瀆.
12) 車輪嶺.
15) 大興山城.

near Syong-do, and proceeding northwards, it forms the water-divide between the Im-jin Gang and the Yöi-syöng Gang. It crosses the Phyöngan-Wönsan road at the east of Ka-chhang where it culminates at Mal-möri¹⁾ and A-mi-san²⁾ with a sharp fault scarp on its east side. I did not lose sight of the ridge till I had reached Tök-chhyön in the upper Tai-dong Gang. The upper Chhyöng-chhyön Gang cuts across the ridge at the curve of Syöi-göri,³⁾ east of Heui-chhyön, and the ridge attains its greatest altitude in the majestic forest-covered Mur-i-san⁴⁾ (1600m.). This granitic ridge is both the highest mountain in West Kai-ma and also an important watershed in the meridional direction.

v.—vii. The *remaining three ridges* are all parallel to one another and are rather insignificant as compared with the preceding four lines. We traverse them on the highway between Phyöng-an and Wön-san. They are the *Chün-kokäi* (500 m.), the *A-ho-bi-nyöng* (760 m.), and the *Ma-sing-nyöng* (1020 m.), the last is in reality a double-ridge, and is easily seen from Wön-san. (See Fig. 5, p. 45.)

1) 馬項
4) 勿移山.

2) 峨眉山.

3) 細街.

IV. CONCLUSION AND SUMMARY.

In recapitulating what has been stated in the foregoing pages, I must first of all say that the geological-structural lines upon which the present paper has been woven, may not be entirely intelligible to the reader without some prefatory geological description accompanied by a geologic map. Some may even cast doubt upon my statements which, of course, must await verification by future observers. In regard to the geology of Korea, I hope I shall be able within a few months to give general outlines with an account of the geological history of the peninsula.

Korea is, as I have said, the Italy of Eastern Asia jutting out southward from the main body of Manchuria, just as Italy does from the other end of Eurasia. It is limited on the north by the equatorial chain of Chyang-päik-san which is looked upon by the Koreans as an offshoot of the great Kuen-lun, after being interrupted in its eastward course by the depression of Liau-tung at I-wu-lii-shan. On the southern foot of the Chyang-päik-san range lies the basin of the Am-nok and Tu-man Gang which are separated from each other at Hyöi-sannyöng (700 m.) by a lava-flow from Päik-tu-san, the highest point (8,900 feet)¹⁾ of the Chyang-päik and the cradle²⁾ of the Korean nation. The Alps and the plain of the river Po are the counterparts of these in the Italian peninsula. They lie nearly in the same latitude, enjoy a

1) 8,025 ft. in James' *The Long White Mountains*, p. 262.

2) "The sacred importance of the White Mountains has been recognized in the Far East for ages. They are first heard of under the name of *Bu-khian-san* (不咸山) [see ante 6]; a name not of Chinese origin, but reminding one of the Mongol Burkhan, as the Gentehi Mountains in Mongolia (according to some, Khan-ola at Urga) were called in ancient times." ".....in the *Chan-hai-king* (山海經), or book treating of seas and mountains, it is called *Pan-hien-chan*." [This seems to be misspelled. B. K.] As to the Chinese mythological history of the White Mountains, I refer the reader to the paper by the Archimandrite Palladius (*Expedition through Mongolia*), translated by Delmar Morgan. *Proceedings R. G. S.*, 1872.

favourable climate, and are inhabited by peoples of very ancient culture.

The peninsula is divisible on good grounds into two sections—North and South Korea—by a trench, in the geological sense, from the head of Gen-san harbour to Kang-hoa Bay, at one corner of which is located Che-mul-pho, the emporium and entrance to the capital, Seoul. This trench or rift-valley is lava-drowned (Pl. I, Fig. 3) and is the only extensive volcanic field in South Korea, except the large basaltic island of Chyöi-jyu (Quelpart) off the southern coast of Chyöl-la Do. This rift-valley or *Graben* of Chyuk-ka-ryöng (510 m.) affords the easiest passage obliquely across the peninsula from the Sea of Japan to the Yellow Sea, and marks the boundary of various geographic elements:

a) Historically, North Korea is the land of *Old Chyo-syön*. The dynasties founded by Tan-gun, Keui-chă, and Ui-man under the name of Chyo-syön, and Ko-ku-ryö or Ku-ryö founded by Chyu-mong, all had their domains mainly in this portion of the peninsula. At a somewhat later time in South Korea sprung up the First Three Hans—Ma-han, Sin-han and Pyön-han, followed by the Second Three Hans of which Sil-la and Päik-chyöi occupied the south, and Ku-ryö only North Korea. From the historical point of view, South Korea is the land of the Hans.

b) Climatically, the North is cold while the South is mild; the latter produces the rice, which is the main staple of the country.

c) Topographically, the *Han-land* (South Korea) is hilly, though lofty mountains crown the high coast along the Sea of Japan, slanting gradually westward and disappearing under the shallow, turbid waters of the Yellow Sea. In *North Korea* we have the two topographic types of the Kai-ma plateau in the north (Figs. 3 and 4.) and the Paleo-Chyo-syön on the south (Fig. 5.), the latter being hilly land of

the type of South Korea though on the average considerably lower. Consequently, the land gradually rises towards the east and most of the large rivers, such as the Am-nok, Chhyöng-chhyön, Tai-dong, Yöi-syöng, Im-jin, Han-gang, Keum-gang and Yöng-san-gang empty into the Yellow Sea¹⁾.

d) The physique and temper of the people in both halves differ in no small measures.

The peninsula of Korea presents most interesting problems in the arrangement of its mountains and in its underground structure. Professors F. v. RICHTHOFEN²⁾ and C. GOTTSCHÉ³⁾ have made an attempt at their solution. On my return home from Korea this year, I had the great pleasure of reading SUSS' *Antlitz der Erde*⁴⁾ which was soon followed by RICHTHOFEN'S *Geomorphologischen Studien aus Ostasien*, I, II, and III. The former author scarcely touches our peninsula, while the latter lets his *Tungusic curve* pass through the brinks of the East Kai-ma Land as far as to Ho-do (Hóá-do) near Ham-heung, and makes the *Korean curve* start anew from here and go

1) See Figs. 1 and 2 in p. 22; Figs. 3 and 4 in p. 40, and Fig. 5 in p. 45.

2) *Vide ante* p. 4. Whenever I read his work on China, I am impressed with the great skill with which he treats the difficult names of that country. The method of correctly writing and transliterating in Roman letters geographic names outside of Europe and America is a matter always confronted with many difficulties. F. v. Richthofen's monumental work: *China*, is in this respect the first of the kind in all geographical literature. His painstaking study of the local ideography, combined with Sir Wade's system, eventually enabled him to give a true reproduction of the pronunciation of both the personal and geographic names of China. The nomenclature of that country, at least in the German-speaking circle, now seems to have been brought into uniformity by this great authority on the subject.

I experienced the same difficulty in Korea, that Richthofen had in China; for though the Koreans and the Chinese use the same ideographic symbols, yet they attach different sounds to them; just as in the case of one and the same character our own pronunciation differs from that of the Chinese. I was therefore obliged to compile with the help of Mr. Kanazawa, a list of about 3,000 Korean geographical names in the romanized form. This list, bearing the title: *A Catalogue of Geographical Names of Korea*, is now in press. A geographic map on the scale of 1:2,000,000 will come out within a few days bearing my system of transliteration.

3) *Loc. cit.* See page 4.

4) Band III, Part I.

around the outer side of South Korea as far as to the mouth of the Yang-tze-Kiang. The two curves are said to enclose the land that corresponds to the inner *Staffelland* of the Great Khingan (Hsin-gan) and Taipanshan in China. The peninsula seems to have interested our two masters almost as deeply as it has the political leaders of our times. Let me try to reiterate what has been said in the present paper in regard to the geomorphology of the peninsula.

i. Archaean formation composed, as elsewhere, of gneiss-granite, gneiss and mica-schists, is thrown into broad, undulating folds on the front side of the peninsula, in the western portion of the Han-land and Paleo-Chyo-syön, becoming steeper as we go south. The axis of folding stretches from S.S.W. to N.N.E., or S.W. to N.E. Two prominent crests of this type are the No-ryöng and Chhya-ryöng ranges which extend obliquely across Chyöl-la Do and Chhyung-chhyöng Do. Besides, many small swellings of the crust-surface can be seen in the Paleo-Chyo-syön Land, though deeply hidden under the mask of Paleozoic formation. Nearly half of the area of the peninsula is occupied by folds of this class. These specialized folds should be classed, according to my view, with the Sinian System of South China, as was originally intimated by PUMPELLY.¹⁾

It is a well-known fact that F. v. RICHTHOFEN prolongs his ideal line of the Sinian System to the frame-work of South Japan, a view endorsed by Dr. E. NAUMANN,²⁾ and the late HARADA.³⁾ L. v. LÓCZY⁴⁾ is, on the other hand, disposed to think that it is the Tching-ling-shan that is prolonged to South Japan through the Hwai Mountains and the mouth of the Yang-tze-Kiang where the Sinian System clings to

1) See *ante* p. 14.

2) *Ueber den Bau und die Entstehung der japanischen Inseln*, Berlin, 1885.

3) *Die japanischen Inseln*, S. 28.

4) *Die wissenschaftlichen Ergebnisse der Reise des Grafen Béla Széchenyi in Ostasien*, Bd. I, 08.

it (*Anschmiegung*). But no one knows what became of them after they disappeared in the Tung-hai.

The broad belt of the Sinian System which obliquely crosses the Korean peninsula, if extended beyond the Tung-hai, will join with the mountains of South China, to which the name Sinian System was originally given by PUMPELLE. Baron v. RICHTHOFEN'S ideal line¹⁾ runs from South Japan to Fuchou and then goes along the coast of Fokien and Kwang-tung, as is well seen on H. FISCHER'S map²⁾ of East Asia. As may be seen on any tolerably good map of South China, a greater portion of the Sinian System, of which Ta-yü-ling³⁾ forms the axis, enters the Tung-hai between Fuchou and Shang-hai, and its further prolongation will correspond well both in its direction and its breadth to those which I venture to call the Sinian folds of Korea.

It should be specially remarked that, if the Sinian System in Korea be prolonged to the north-east, a greater part of the folds will again unite directly with the tectonic lines of the Sichota-alin, as they are given in Ivanow's work.⁴⁾ (Pages 13-17.)

ii. The Sinian represents an old system of crustal folds in the peninsula; and contemporaneously with it or a little later, there was generated another system in the Liau-tung direction in the Kai-ma Land, which was posthumously faulted in serial order towards the south, producing the parallel ridges of Myo-hyang-san, Työk-yu-ryöng and Kal-eung-nyöng. These trend from W.S.W. to E.N.E. and form apparently the direct continuation of South Manchuria. The well-known Chyang-päik-san stretches, however, *east and west*, obliquely

1) *Die morphologische Stellung von Formosa und den Riukiu Inseln.* Sitzungsberichte der Kön. Preuss. Akad. d. Wissenschaften z. Berlin, 1902, S. 964.

2) E. Debes' *Neuer Handatlas.* No. 44.

3) 大庚嶺.

4) *La chaîne du Sikhota-Alin*, p. 112. Explorations géologiques et minières le long du Chemin de fer de Sibérie. Livraison XVI. St. Petersburg, 1898.

meeting the preceding in the basin of the Tu-man Gang. The upper Am-nok Gang drains the acute angled area between the two systems which are cut down crosswise by the Syo-Chyang-päik-san at the north-east coast of Ham-gyöng Do. (Page 34.)

iii. By the Korean System I mean that complex of uplifted edges and sometimes folds which run more or less in north-south direction along the long axis of the peninsula. It is so characteristic to the physiognomy of the land that even native geographers¹⁾ long before us recognized its great importance in the surface-features of the peninsula. It is also so peculiar to Korea that I know of no other mountains bearing the same trend as these in South-east Asia. I presume, however, that something like the *Korean direction* may perhaps be looked for beyond the Chyang-päik-san range in Kirin and also at the terminal portion of the long ridge of the Great Khingan. Also a part of Kyu-shu (Japan) may be within its reach.

Within the complex of the Korean System, there seem to exist *two natural subgroups* which are named respectively the Thai-Päik-san and the Syo-Päik-san.

a. The first constitutes the backbone of the peninsula extending from the south-east of Kyöng-syang Do toward the N.N.W., along the coast through Thai-Päik-san, O-däi-san and Keum-gang-san. After a short interruption it seems to stretch to Nang-nim in the Kai-ma Land which is separated by it into east and west halves, while at the same time it forms the boundary of Phyöng-an and Ham-gyöng. A sudden turn of the upper Am-nok,—the Angle of Mao-êrh-shan,—is probably due to its prolongation, while the axial trend of Kö-chyöi Island indicates how the mountains curve a little to S.W. on entering the South Korean Archipelago.

Five components of the Thai-Päik-san are the cliffs of tilted

1) See *ante* p. 6.

blocks sweeping along the coast of the Sea of Japan, from which the right wing was successively thrown down to the sea-bottom, as if it originated in disjunctive faults as an after-effect of the piling and pressing up of Hondo (Japan) toward the Pacific Ocean. (Pages 17-22.)

b. The second or Syo-Päik-san subgroup is also composed of fault-scarps which trend south of south-west. This sub-group builds the water-parting and boundary-wall between Kyöng-syang on the one side and Chyöl-la and Chhyung-chhyöng on the other. Instead of maintaining the nearly parallel course of the members of the Thai-Päik-san, the four component-ridges of the Syo-Päik-san diverge from near the pass of Chhyu-phung-nyöng in feather form in South Chyöl-la Dó. In its north-eastern course the Syo-Päik-san is cut off by the Thai-Päik-san, exactly as the fold-crest of No-ryöng, already described, which, however, differs slightly in direction and greatly in its structure from the Syo-Päik-san members. (Pages 22-26.)

iv. No less remarkable than the preceding is the direction of the *Han-san Range* which chiefly confines itself to the southern border of South Korea. It trends from W.S.W. to E.N.E.; and corresponds well with the north side of South Japan, but as regards its western prolongation it is no easy matter to conjecture what will be its probable continuation. I simply suggest the idea that we might look for its linear extension in the basin-ranges that govern the course of the Lower Yang-tze Kiang. These low ranges seem to belong neither to the Kuen-lun, nor to the Sinian. (Page 31.)

The Han-san Range resulted from a later geologic event than that which produced the Korean System. The former is composed of a number of tilted edges of faults which threw down block after block to the Southern Sea. The sea-coast is dotted with an innumerable number of islets and rocks, and describes complicated in-and-out

curves. These peculiar features which characterize the coast, are nothing more than the outcome of the joint-work of the orogenic movements that gave form to the Korean and Han-san ranges. The inlets are the remains of tectonic valleys, while the headlands represent the ridges. Especially remarkable is the narrow canal of the free port, Ma-san-pho which presents the outline of a compound cross with a single axis, due to the Korean and Han-san ridges which intersect each other on both sides of the entrance. (Pages 26-31.)

This is a special form (Pl. III, Fig. 2) which truly deserves an independent position in the list of many coast-types. I name this the *Nam-hǎi* type, as this special kind of coast-line is seen all along the shores of the *Nam-hǎi* or South Sea of South Korea.

v. A great number of small ridges or fault-scarps traverse like a gridiron the whole of Paleo-Chyo-syön. The region is somewhat similar in its geological structure to the western half of Shan-tung. Well-established rules can be scarcely discovered in the arrangement of ridges. The whole tract is broken up into a number of long orographic blocks, each being of old sedimentaries, mainly of grey tabular limestone. Each block is tilted along the long side with steep walls, while it slants gradually towards the opposite direction. Some of the *equatorial* ridges may be brought into connection with the tectonic line of Shan-tung, *e.g.*, Myör-ak-san of Hoang-hǎi Do, while others of the same group are difficult to correlate with any known system. *Meridional* ridges, though coinciding in direction with some of the Korean System, do not harmonize with each other in position, nor in magnitude of disturbance; the general plan of the west coast, however, seems to have been greatly influenced by them. (Pages 46-50.)

In short, the intercrossing fault-scarps of Paleo-Chyo-syön inserted between the Sinian and Liau-tung systems seem to be the

result of a passive movement and after-effect of the still greater tectonic disturbances which gave to the crust-block of the Korean peninsula its present form.

December, 1902.

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PLATE I.



FIG. 1.—THE CANYON IN THE DIAMOND MOUNTAINS.



FIG. 2.—THE TAI-KOAL-LYŬNG RIDGE, RUNNING NORTH-SOUTH. SEEN FROM THE EASTERN COAST.

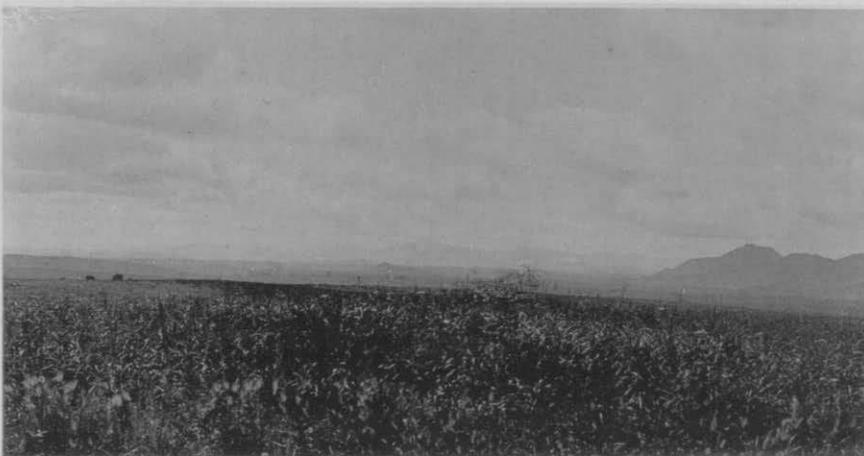


FIG. 3.—BASALT PLAIN OF THYŬL-UŬN, SEEN FROM THE NORTH, LOOKING DOWN THE MESA.

PLATE II.



FIG. 1.—SURFACE-FEATURE OF THE BASALT PLATEAU, 1,700M HIGH, EAST KAI-MA, SEEN FROM THE WESTERN MARGIN.



FIG. 2.—CANYON-LIKE VALLEYS IN THE SAME.



FIG. 3.—THE SMALL CHYANG-PÄIK-SAN RANGE, ON AVERAGE 1,300M. HIGH, RUNNING NORTH-SOUTH, SEEN FROM SYU-SYÖNG, NORTH OF KYÖNG-SYÖNG.

PLATE III.



FIG. 1.—WESTERN VIEW OF THE NORTH END OF CHIRI SAN, SEEN FROM THE HIGH FLAT OF UN-BONG.



FIG. 2.—THE DEEP INLET OF MA-SAN-PHO, LOOKING SOUTHWARD, SHOWING SMALL HEADLANDS JUTTING OUT FROM BOTH SIDES.

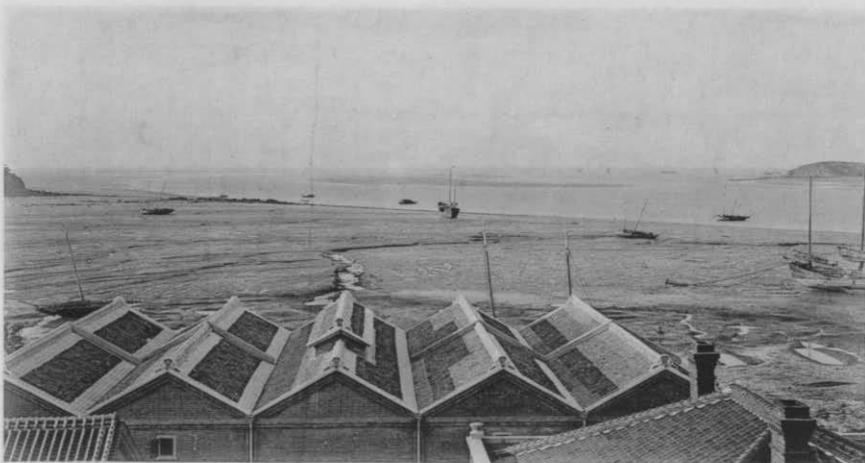


FIG. 3.—EXTENSIVE MUD FLAT EXPOSED DURING LOW TIDE, AT THE FREE PORT OF CHE-MUL-PHO.

