

# ANNUAL REPORT OF THE GEOLOGICAL SURVEY OF KWANGTUNG & KWANGSI

CHU CHIA HUA, DIRECTOR

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## PREFACE

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GEOLOGY in China has not been scientifically studied until recent years. Therefore a general geological mapping of the country is not yet completed. About sixty years ago, after von Richthofen had travelled over a great part of China and after the publication of his work, a general idea of the geological structures of mountains and valleys of China had been brought to the attention of the world. At the end of the Ching Dynasty, a geological department was organized in the Peking National University, and two German professors were engaged to head the department. Unfortunately there were only a few students who took this subject, so the department was soon abolished. At the beginning of the Chinese Republic 1912, Messrs. H. T. Chang, V. K. Ting and Dr. W. H. Wong established a Geological Survey and a Geological Institute, both of which were under the control of the Ministry of Agriculture and Commerce. Some years later a Geological Society of China was also organized with Mr. H. T. Chang as the first president of the society. Quite extensive geological surveys have been executed under the jurisdiction of these societies and considerable areas principally in North China, have been mapped. A number of bulletins have been published. By such means, the geological work of China has become better known to the world and many capable chinese geologists have been developed. The development of the geological work is, however, much handicapped by the constant political changes and civil wars, although the geologists have been working enthusiastically in northern provinces. Accordingly, the Geology of Kwangtung and Kwangsi Provinces has not yet been touched, except von Richthofen's work along the road from Canton to Hunan, Mr. Leclère's work in south-western Kwangsi and some Japanese works of the Geographical Society of Tokio along the west river of both Kwangtung and Kwangsi.

As soon as I came to Canton in the year 1926, I was very anxious to make some geological trips in order to develop the geology of Southern China. But as other duties of Political Council of Koumingtang, and of Sun Yatsen University had fallen upon

me, I was hardly able to undertake such kind of work. In the Summer of 1927, after the revolutionary army captured many cities along the Yangtze River, and had settled the capital at Nanking, the Political Councilers of Canton had some time to devote to the affairs of reconstruction. By taking this opportunity, I made a proposal to the Political Council to organise a Geological Survey of Kwangtung and Kwangsi. This proposal was adopted, and a staff established in September of the same year. I was appointed as the director of the Survey. Both Messrs. Yih Liangfu, Professor in Geology of Sun Yatsen University and Hsieh Chiayung had helped me a great deal in the organization of the Survey. Unfortunately both of them left Canton in the Spring of the year 1928.

As soon as the Survey was organized, we planned to do the field work.

In October of the year 1927, Messrs. Hsieh Chiayung and Fong Kinlan made a survey along the Canton and Kowloon Railway. It was the first geological work done by the Chinese in Kwangtung and Kwangsi Provinces.

After the completion of the first trip in December, two more parties were sent out in order to make some expeditions to Kwangsi Province. One party was intended to start the work from Wuchow (梧州), including an area of the east and northern portion of Kwangsi Province. The other was intended to go up Yu Chiang River (鬱江), including an area of south-western part of Kwangsi Province. Just before starting of the expeditions, a war broke out between two Provinces, and communication from Canton to Kwangsi was interrupted. Under this condition, the scheme of the expedition was changed, and then Mr. Fong Kinlan went to the northern border of Kwangtung Province for surveying in the district of Chu Kiang (曲江), Jen Hua (仁化), Shih Hsing (始興), and Nan Hsiung (南雄). This was the second time of our field work.

After the riot of the communists at Canton in December of 1927, bandits were abundant everywhere in the two provinces. But the work of the survey was not much affected. Mr. Hsieh Chiayung and others made a trip to Chih Ni Ho (赤泥河). Mr. Fong Kinlan



took another trip along the Canton Hankow Railway. Mr. Chang Huijui also made a trip to Wong Yuan district (翁源). These three parties all worked in Kwangtung Province. In Kwangsi Province, Mr. Chu Tingoo took a trip in Kuei Hsien (貴縣), Heng Hsien (橫縣), Yung Ning (邕甯) and Ping Yang (賓陽) districts and Mr. Yoh Sên-shing took a trip to Nan Tan (南丹), Ho Chih (河池), I Shan (宜山), Ma Ping (馬平) districts. Their work was continued for about three months. From these trips, the geology of Kwangtung and Kwangsi Provinces becomes gradually known. In May of 1928, the Political Council of Canton intended to solve the problem of the West Islands, and Mr. Chu Tingoo was appointed to make a survey on the Guano Deposits of these Islands. This may be called the third of our field work.

Because of these trips, the knowledge of geology has been much enlarged. For instance, the stratigraphy of Kwangtung and Kwangsi was generally divided into two main groups by the preceding authors. The lower group includes the beds from Cambrian to Devonian, and the upper group Carboniferous and Permian. It is found now that a great unconformity is present after Cambrian. Ordovician formation is wanting. Silurian and Devonian formations are much developed. In certain parts, the Devonian contains plenty of fossils by which we are able to distinguish different horizons. Carboniferous and Permian may be also divided into different formations by the material collected from north-western part of Kwangsi. Again it was known that the Red Beds are the only consolidated rocks since Paleozoic, but now the Pliocene formation was discovered unconformably upon the Red Beds. The igneous activities at Kwangtung are important, although a detailed study is not yet done, the structure of the Paleozoic formations is mostly affected by the intrusion of granite. The volcanic activities along the coastal region are also important, and need more study. The physical conditions relating to geography are not yet much studied. A brief account of the development of different rivers in these two provinces is only mentioned in these reports. These results that we have accomplished in a very short period seem to be interesting and valuable and may form a foundation for our future work.

In the year 1928-29, six parties were sent out, four to Kwangtung Province and two to Kwangsi. In the eastern part of Kwangtung one party was sent to survey the districts Huei Yang (惠陽), Lung Men (龍門) and the neighbouring six districts. In the western part another party was sent out to survey in San Shui (三水), Szu Hui (四會), Kwang Ning (廣甯), Kao Yao (高要), Kao Ming (高明), Hua Shan (鶴山), Hsin Hui (新會) and Chih Chi (赤溪). A third party was sent out to survey the southern part in the region of Chin Chow (欽州), Lien Chow (廉州), Lei Chow (雷州) and the fourth party the northern part of Hai Nan Islands (海南島). In Kwangsi Province one party took the geological work from Liu Chow (柳州) and along the border of Kweichow Province, and other party surveyed an area between Liu Chow and Kuei Lin. The above is our fourth field expedition, and the reports of this work will be published in the next volume.

Attention is also paid to the mineral resources of Kwangtung and Kwangsi. The guano deposits of western Islands, the tungsten deposits of Wong Yuan district (翁源), and bismuth deposits of Ping Yang district (賓陽) in Kwangsi Province has been studied in detail, and their results are published in this volume. Again the coal deposits of Chu Kiang (曲江) and Ju Yuan (乳源) districts, manganese deposits of Chin Chow (欽州), Wu Hsuan (武宣), Lai Ping (來賓) districts, and coal of Ssü Men (寺門) and Ho Shan (合山) have been also studied, and their results will be appeared in the next volume. Further more, the limestone and clay of Hua Hsien (花縣) and Ying Tah (英德) for cement and fire brick works have also been studied by us. Those new discoveries are the Manganese deposits of Hung Hsien and Fluorite deposits of Lok Chang (樂昌) district. Other deposits which have been studied are published in our reports from time to time. The famous tin deposits of Fu Chuen (富川), Ho Hsien (賀縣), Nan Tan (南丹) and Ho Chih (河池), copper deposit of Yu Lin (鬱林), antimony of Chu Kiang (曲江), silver and lead deposits of Ta Pu (大埔), Chiao Ling (蕉嶺), etc. have been surveyed in detail.



In the winter of 1928, the famous professor Dr. Otto Jaekel was engaged to Canton to head the palaeontological work. It was certainly very fortunate to have such a professor to work with us, as his work has attended a high position in the world's science. Unfortunately Professor Jaekel died at Peiping when he was attending the conference of the Geological Society only after four months of residence in China. His death means not only the loss of a good friend to us, but also a great loss in the scientific research to the world as a whole. That he was highly honored can be seen from the official issue on the occasion of his death issued by the Central Government.

In the spring of 1929, a famous geologist Dr. Arnold Heim is also engaged. His work has also been known to the geologists of the world. Certainly, he will help us a great deal in developing Geology, especially in South China. But his work is not yet ready for publishing in this volume.

This report covers a few month-work of the first year. I understand that these reports are rather incomplete in many respects. It is our aim to contribute, as much as we can, on the stratigraphical relations, the principal fossils of different horizons, the relations of igneous rocks with sediments, and the development of mountain features and rivers.

As the leader of each field party has to make a brief report soon after his return from the field, the publication of this report is delayed until after all parties have returned. Any suggestions and criticisms from our readers will be greatly appreciated.

Dr. CHU CHIA-HUA,  
*Director of the Geological Survey of  
Kwangtung and Kwangsi.*

CANTON, *May 1929.*

# A PRELIMINARY REPORT ON THE GEOLOGY AND MINERAL RESOURCES OF KUEI, HUNG, YUNG CHUN, YUNG NING, AND PING YANG DISTRICTS, KWANGSI PROVINCE

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With Two Plates

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By CHU TING-OO 朱庭祐

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## INTRODUCTION

This paper contains a brief report on a reconnaissance work which was undertaken by the author in collaboration of Mr. Li Tien Chen (李殿臣), junior geologist of the Geological Survey of Kwangtung and Kwangsi, in the Spring of the year 1928. The area studied is the southern part of Kwangsi Province including Kuei, Hung, Yung Chun, Yung Ning, and Ping Yang districts (貴, 橫, 永淳, 邕寧, 賓陽等縣). In regard to the plan of the work, the geological mapping and the investigation of rocks and minerals, the author is taking the responsibility. Mr. Li Tien Chen has, however, done also a great deal of work in collecting fossils and preparing the field work. A part of the fossils have been identified by Mr. Yoh Sen-sing and Dr. Chang Hsi-chih (樂森舉, 張席祺), and some of the ore minerals are analysed by Messrs. Chang Ming Chao, Chu Huei Sheng, Yang Tseng Wei, and Yih Han Ying (張鳴韶, 朱翹聲, 楊曾威, 燕漢英), to whom the author is very much obliged.



## GENERAL TOPOGRAPHY

The area surveyed is drained by the famous river Yu Chiang (鬱江), except in the north eastern part of Kuei and Ping Yang districts where the water flows northward into another famous river Liu Chiang (柳江). The name Yu Chiang is given to the river only between two conjunctions, one at the western part of Yung Ning district where two rivers called Tso Chiang (左江) and You Chiang (右江) from Lung Chow (龍州) and Pe Se (百色) respectively are joined, and the other at the east of the city of Kuei Ping district (桂平縣) where the rivers Yu Chiang and Liu Chiang are joined. The distance of this river between two conjunctions makes up three hundred kilometers approximately. The distributions of the mountains, valleys, and peneplains in this area show very interesting topographical features. These may be described as follows.

MOUNTAINS:—The mountains are present in several groups according to their natural distribution. The location and general feature of each group will be described first.

1. The Tien Ping Shan (天平山) mountains are located at the northern portion of Kuei district. There are two parallel ranges stretching from SW to NE. The length of each of these ranges is about 50 kilometers and the elevation of the conspicuous peaks is from 500 to 700 meters above sea level. At the south-western end these two ranges are connected, and a most prominent peak Tien Pien Shan is present with an elevation of 800 meters. In the north-eastern part, two ranges are separated. They are both much eroded by the tributaries of the river Liu Chiang. The region between the two ranges is also mountaineous, but the elevations of the mountains are unimportant.

2. The Chen Lung Shan (鎮龍山) mountains occupy the region between Kuei, Hung and Ping Yang districts. At the south of Li Tang Yu (黎塘圩), a principle peak of 800 meters above sea level is present. From here one range extends in a SE direction for more than 50 kilometers to the place Hsieh Yu (謝圩). Another range runs south west for more than 50 kilometers to the place Ku Cheng Yu (古城圩). The distance between Hsieh Yu and Ku Cheng

Yu is also 50 kilometers, and so in the plane these mountains have a triangular form. The different ranges make this area very complicated. No detailed survey has been made.

3. The Hung Hsien (橫縣) mountains are present at the western portion of Hung district, stretching from the side of Yu Chiang to the north of Chiao I Yu (交椅圩). The distance from south to north is about 50 kilometers and from east to west about 15 kilometers. High peaks which are present at the eastern side all in a long row, while in the western side are more scattered. The most prominent peak of this range is called Chan Ku Shan (瞻顧山), about 500 meters above sea level. Other mountains have an elevation of 300 to 400 meters. They form very likely an ancient surface of erosion.

4. The Kuei Nan (貴南) mountains are located at the southern part of Kuei district, on the south side of Yu Chiang. There are several parallel ranges in the direction of ENE to WSW. The highest peak is called Ya Chi Shan (鴉髻山), 500 meters above sea level. These ranges extend to Mu Ko Yu (木格圩) at the east and to Fu Po Tan (伏波灘) at the west with a distance of 50 kilometers approximately.

5. The Yung Yung (邕永) range is stretching from Tsien Tao Yu (剪刀圩) of Yung Ning district to No Ho Yu (那何圩) of Yung Chun (永淳) district for a distance of more than 70 kilometers. The direction of this range is almost ENE to WSW. High peaks are present in a linear form with an elevation of more than 500 meters above sea level.

6. The Yung Ping (邕賓) range is present at the northern part of Yung Ning district and the south western part of Pin Yang district. The range is parallel to the Yung Yung mountains at the south, having almost the same distance and elevation.

7. The Yung Ning (邕寧) mountains are present at the region of the north eastern portion and the southern portion of Yung Ning district. These mountains usually form low and long ridges with very gentle slopes.



8. The Hung Yung (橫永) mountains are present in the region of the western portion of Hung district and almost the whole area of Yung Chun district. They have no regular ranges. But at some part, they are continuous mountains in very irregular form and at some part, they are merely scattered hills. The elevation of these mountains are generally about 300 to 400 meters above sea level.

9. The Kan Tang (甘棠) mountains are present at the vicinity of Kan Tan Yu (甘棠圩), northern portion of Yung Chun district. Some high peaks such as Kao Shan Lin (高山嶺), Ta Jen Lin (大人嶺) and Tsing Hua Lin (青化嶺) reach more than 800 meters above sea level. They are separated from each other by plains or streams. Moreover, these mountains are situated practically between the Chen Lung Shan, Hung Hsien, Yung Yung, and Yung Pin ranges, without being the prolongation of one of them.

The relation between the forms of the mountains and the characters of rock is very characteristic. The highest peaks of different ranges are all formed by the compact quartzite of Silurian. The lower mountains in close connection with the peaks are formed by the thin bedded, soft sandstones and shales of Cambrian. The conspicuous, isolated hills and partly the peneplains are formed by the limestones of Carboniferous to Permian. The gentle slope ridges intercalated with V shaped valleys at the north western corner of Kuei district are formed by the sandstones and shales of Permian period. The Hung Yung mountains are formed by the red sandstones, and shales. The Yung Ning mountains show sandstones, shales and clays of the Tertiary period. Finally, the mountains with rounded tops at the southern portion of Ping Yang district, the southern boundary of Kuei and Hung districts, and Lu Ling, a village of the northern portion of Kuei district, are formed by the granite.

The relation of the mountains with their geological structure is also very characteristic. Thus, the two ranges of Tien Ping Shan mountains represent the two limbs of an anticline. Also in Chen Lung Shan and Hung Hsien mountains similar structures are found.

The ranges of Kuei Nan mountains are made by repeated anticlinal and synclinal foldings. The Yung Yung and Yung Ping ranges are again made by two limbs of an anticline. Besides this, also the faults are an important factor of mountain-making. At the west edge of Hung Hsien mountains for example, a fault line is present in a north-south direction. At the surroundings of Kao Shan Lin, Ta Jen Lin and Tsing Hua Lin, fault lines of different directions are the cause of the discontinuity of these mountains. But the most important factor is the intrusion of granite which has affected the structure of Tien Ping Shan, Chen Lung Shan, Kuei Nan, Hung Hsien, Yung Yung and Yung Ning mountains apparently.

**DRAINAGE:**—As has been mentioned above the principle drainage of the region surveyed is the river Yu Chiang and its tributaries. This river has two different directions, namely SE and NE. It is also very characteristic that the south-easterly parts of the river are more crooked than the north-easterly parts, and have more sand bars instead of the rapids made by the hard rocks of the north-easterly rivers.

The characters of the different parts of the river are also related to the presence of different geological formations and their structure. The north easterly parts of the river are almost parallel with the strike of the rocks or the strike of the ranges. The rocks present along these parts are mostly limestones and quartzites. On the other hand, the south easterly parts of the river have not much relations to the structure of the rocks as far as the Red Beds and the Yung Ning series of the later periods are present.

In regard to the development of the river we come to the following conclusion. The north easterly parts of the river may have been developed at first in the form of two disconnected streams, while the region between Lu Ching Yu and Si Chen (西真) of Hung district is still a lagoon or a lake, in which the materials of the Red Beds are deposited. If the accumulation of the Red Beds is accomplished and the water is retreated, small streams of various directions must be developed in the basin-like region of the Red



Beds. But the erosion of the north easterly river at Si Chen moves backward very fast on account of the weakness along the contact of the granite and the sedimentary beds. The easterly river will capture the streams of the basin and will drain the north easterly part between Lu Ching Yu and Tsien Tao Yu.

Furthermore, the north easterly rivers are not developed only along the synclines but also on the axis of the anticlines. Thus, a river between the Yung Yung and Yung Ping ranges must be developed at first. Along this river the deposits of the Yung Ning series are deposited during its flood time. But the backward erosion of a tributary of the north easterly part of Yu Chiang river at the west of Tsien Tao Yu is also very fast, causing the capture of the former river which runs along the axis of the anticline.

The tributaries of Yu Chiang are plenty in number, but have not been investigated in detail.

**PENEPLAIN:**—A peneplain occurs at the vicinity of the city of Kuei Hsien, and at the eastern parts of Hung and Ping Yang districts. In this region the limestone is much eroded and forms a plain, some isolated hills as the monadnocks excepted.

## **STRATIGRAPHY.**

The geology of the region has not been surveyed by other geologists before, except by Mr. M. A. Leclère, a french geologist who travelled from Pin Yang to Yung Ning during the year 1898 to 1899. However, Mr. Leclère's work is suggestive; his classification of different geological formations is rather simple. The author has classified the strata into six principal series with some minor phases. Although our classification is still not very detailed and incomplete on account of the lack of the study in fossils, the author would think that the following classification given on the accompanying map will be convenient for the present.

### **1. Lungshan Series (龍山系)**

This division is first seen at the place near the village of Lung Shan Yu, north of Kuei Hsien. The rocks are principally sand-



Columnar section showing the succession and thickness of the different formations in S. Kwangsi

stones and shales with small seams of thin-bedded calcareous parts. The sandstones are yellow, red, gray and white and of a very fine grain. They are thin bedded and soft, showing cross beddings. Mica flakes are also frequent.

On the weathered surface, also the shales are yellow and gray. These sandstones and shales are repeatedly interbedded. Sandy shales and clayey sandstones are present as varieties. The rocks are however much metamorphosed along the contact with granite.

The distribution of Lungshan series conforms with the region where the big anticlinal folding of Lienhuashan series is present. Outcrops of this series are found on the northern part of Kuei district such as at Lung Shan Yu (龍山圩), and from there 50 kilometers in a north east direction, in the southern part of Kuei district near Cheng Chiang Yu (呈江圩), in the south of Chen Lung Shan, in the western part of Hung district, in the south eastern part of Hung district, in the region between Yung Yung and Yung Pin ranges and in the southern and western parts of Ping Yang district.

The Lungshan series always forms the base of the other divisions, and is in unconformable contact with the others. There are plenty drag foldings present in this series. It is very common that at the places where this series is normally developed, the direction of its strike makes a small angle with the direction of the ranges or the strike of Lienhuashan series. But along its contact with granite, its structure is much changed. Again, at the western and the south eastern parts of Hung district, and in the northern part of Kuei district, the presence of this series shows the surface of an old peneplain.

In the Lungshan series, fossils are hardly found. Therefore, its geological age is doubtful. Although Leclère has mapped it as Cambrian, the author is rather inclined to say Early Paleozoic.

The total thickness of Lungshan series is unknown because no complete section is seen. A rough estimation from the section north of Yung Ning district suggests a thickness of probably more than 1,200 meters.



## 2. Lienhuashan Series (蓮花山系).

This series is encountered first at Lien Hua Shan of the northern part of Kuei district. At the bottom there are beds of compact conglomerate of a few meters. Then follows compact, thick-bedded quartzite intercalated with thin beds of shale. The quartzite is more frequently red than white, and of a coarse grain. The shales are gray and red. The thickness of these rocks is about 800 meters. In this order upwards the shale becomes more abundant, being interstratified with sandstone and locally thin beds or lense shaped limestone. The thickness of this subdivision is more than 400 meters. In the upper-most part of this series there are very fine and thin bedded shales and sandstones. Two horizons of thin bedded limestone each of a few meters occur together with gray and black shales and sandstones within a complex of some 20 meters. At some places, lignite is also found between these shales.

From the upper horizon of the thin-bedded limestone to the white, thick bedded limestone, which is far above the lignite, it is quite possible to find another formation. But this is unknown on account of lack of good outcrops. The sections, one from the village Shang Shih Lung Yu (上石龍圩) to Liu Feng Ting (流風亭) and the other along the main road from Yung Ning Hsien (邕寧縣) to Wu Ming Hsien (武鳴縣) between Ta Kao Feng Ai (大高峯隘) and Mi Hua Ping (米花坪) are shown on plate II, sections III & IV.

The distribution of Lienhuashan series corresponds with the high ranges, the quartzite making up the conspicuous peaks, so in Tien Ping Shan, Chen Lung Shan, Hung Hien, Kuei Nan, Yung Yung and Yung Ping ranges. In Kao Shan Lin, Ta Jen Lin and Ching Hua Lin, the Lienhuashan series is also present at the higher parts.

As mentioned above the contact between Lungshan series and the Lienhuashan series is unconformable. On the other hand, it is not certain whether or not the contact above Lienhuashan series, *i.e.*, between Lienhuashan series and Kueih sien limestone is conformable.

Fossils are very abundant in the upper part of Lienhuashan series. As the collections have not yet been thoroughly studied, the author can tell very little in this report. At the east of Shang Shih Lung Yu fossils have been collected from five different horizons (see Section III, Plate II). In the ascending order the first one is the brown fine shale containing chiefly *Spirifer* and *Lingula*. The latter is doubtfully to be *Lingula launanensis* Mansuy. The next one is the gray, soft shale containing *Spirifer*, and *Crinoids*. The third is the limestone with Corals and *Crinoids*. The Corals identified by Mr. Yoh Sen-sing show that *Favosites* sp. is most common. The fourth is the gray shale containing *Spirifer*, *Pelecypoda*, etc., as the most important fossils. The fifth is the thin bedded limestone with corals such as *Fasciphyllum varium* Schluter, and *Bryozoans*.

At the eastern part of Yung Ning district fossils have been collected from the same series near the village Tsien Tao Yu (剪刀圩), amongst which the author could recognise some *Lingula* sp. from the sandy shale at the north side of the river Yu Chiang. Mr. Yoh Sen-sing has also recognised some of them such as *Favosites* sp., *Favosites cervicornis*, *Spirifer Verneuli* Murchison var. *Yunnanensis*, *Spirifer Cheekiel*, *Chonetes orientalis*, *Dalmanella tetragona*, *Athyris Concentrica*, *Atrypa reticularis*, *Stropheodonta* sp. and *Proetus indosinensis* Mansuy.

Besides, in the southern part of Kuei district, near the village Miao Tan (廟灘) *Spirifer tonkinensis* was collected. At other places where Lienhuashan series is present, many specimens of *Spirifer* and *Crinoids* were noted, and at the north of the village Shih Niu (石牛) of Kuei district, marks of fossil plants are found.

From the above statement, the fossil bearing formation of Lienhuashan series comprises certainly Middle Devonian, i.e. equivalents to the Givetian of Europe, and the Middle Devonian of eastern Yunnan. The quartzite at the lower part of Lienhuashan series may be of Silurian, and the thin bedded limestone at the upper-most part of Lienhuashan series a little younger.