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## BULLETIN OF THE GEOLOGICAL SOCIETY OF CHINA.

### PROCEEDINGS OF THE FIFTH ANNUAL MEETING HELD AT PEKING, FEBRUARY 12-14, 1927.

#### MORNING SESSION OF SATURDAY, FEB. 12.

The first session of the Fifth Annual Meeting was called to order at 10 A.M. Saturday, Feb. 12 in the Library room of the National Geological Survey, 9 Ping Ma Ssu, west Peking by the president of the Society Dr. W. H. Wong. The president in a few words reviewed the activity of the Society during the past five years and laid special emphasis on the highly scientific interest of the papers read in its meetings. He warmly appreciated the contributions of the members who often come from long distance to attend the Annual Meeting. The Society is thus a center of all workers on geology of China, and in serving a medium has helped to the advancement of our science.

After these introductory remarks, Dr. Wong read his presidential address entitled "Crustal movements and igneous activities in eastern China since the Mesozoic time". The whole paper will be published in the bulletin.

After some discussion, the president called on Prof. J. S. Lee to read his paper "on the mechanical significance of some fold-arcs and their associated longitudinal deformation". This results from his continued study on the "Fundamental cause of the evolution of the earth surface feature" of which he had published already a paper in the last year bulletin.

Prof. Lee continued with a second communication on the recurrence of certain geological phenomena. He mentioned, among other things, the importance of cephalopoda (as orthoceras etc.) in Ordovician during the Palaeozoic era and again (as ammonites) in Jurassic during the Mesozoic. Similar fact is observed with the foraminifera which dominated the Carboniferous seas by the fusulina and the Tertiary by the nummulites. It is hoped that the author will set down his interesting ideas in a paper for the bulletin of the Society.

The following are the reports on the administration of the different units of the Society.

## THIRD ANNUAL REPORT OF THE LIBRARY FUND.

*Receipt*

Balance last year	3950.00 (fix. dep.)
	<u>325.05 (cur. dep.)</u>
	4275.05
Interest May 1925-1926	395.00
Interest up to Dec. 1926	<u>7.10</u>
Total receipt	4677.15

*No Expenditure*

## REPORT ON THE GRABAU MEDAL FUND

*Receipt*

Donation of Mr. C. Y. Wang	600.00
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*Expenditure*

Making of the first Grabau gold medal	179.20
Printing of the regulations etc.	<u>8.00</u>
Total expenditure	187.20
	<u>287.20</u>
Balance	412.80

The above two reports were submitted by Dr. W. H. Wong on behalf of the respective committee with the assistance of Mr. H. T. Lee, the treasurer of the Society.

## REPORT OF THE TREASURER OF THE SOCIETY

The treasurer begs to submit the following report of the finances of the Society for the fiscal year ending Dec. 31st, 1926.

*Receipts*

Membership dues	\$ 300.650
Selling bulletins	171.500
Donations by the Geological Survey	500.000
Interest	6.420
Refund from Mr. Black	150.000
Refund from Library Fund	16.900
Fund Fund received from last year	<u>459.228</u>
Total receipts	\$ 1604.698

Expenditures

Administration	\$ 25.304
Postage	58.640
Printing bulletins	910.320
Expenses for the Annual Meeting of the last year.	79.890
Miscellaneous	92.800
Total expenses	\$ 1166.954
Balance on hand Dec. 31 1926	437.744
	1604.698

H. T. Lee,  
Treasurer

REPORT OF THE BOARD OF EDITORS.

The first number of the Vol. V of the Society bulletin was edited by Mr. L. F. Yih. Owing to his absence in Peking for field work in Yangtze Valley, the editing of the second number was put in the hands of Mr. H. T. Lee. But Dr. Grabau has helped a great deal in reading the manuscript and the proofs. The combined number 3-4 is taken charge of by Prof. J. S. Lee. The work of editing was thus undertaken by various members of the board to whom warm thanks are due.

The following statistics by subjects of the papers published in the bulletin of the last two years will be perhaps of interest to the members.

Bulletin	Miner. & Palaeont. Petrogr.	Stratigr.	Tectonics & region geol.	Physiogr.	Econ. Geol.	General geol.
Vol. IV No. 1	—	—	6	4	—	—
" No. 2	3	2	1	1	1	1
" No. 3-4	2	3	—	1	—	—
Vol. V No. 1	2	1	1	—	1	3
" No. 2	1	2	2	—	—	1
	8	7	10	6	2	7

If we classify the papers printed in the above mentioned bulletins according to the nationality of their authors, the result is as follows.

Nationality of author.	Chinese	American	British	French	Italian	Japanese	Russian	Swedish	Tchecosloveh
Number of papers	32	1	3	1	1	1	1	1	1

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Among the scientific institutions from where come the contribution of paper we may especially mention the National Geological Survey, the Peking National University, the Yenching University, the Peking Union Medical College, the Peking Natural History Laboratory, the Chungchou University, the Hoangho-Paiho Museum, the Zikawei Observatory, the geological Institute of Dairen etc. While this society is essentially a Chinese scientific institution with the great majority of contributions from Chinese geologists, we have always welcome scientific cooperation from all workers on the geology of China.

W. H. Wong  
Chief editor

**ELECTION OF OFFICERS FOR THE YEAR 1927**

The result of the election was as follows, the balloting having been conducted in accordance with the constitution.

**President :** Dr. V. K. Ting 丁江文 former Director of the Geological Survey.

**Vice-presidents :** Dr. C. H. Chu 朱家驊, Prof. of Geology in the Canton National University ; Dr. A. W. Grabau (reelected) Prof. of Geology in the Peking National University and chief paleontologist to the Geological Survey.

**Secretary :** Mr. J. S. Lee 李四光 Prof. of Geology in the Peking National University.

**Treasurer :** Mr. T. C. Chow 周贊衡 Secretary and paleontologist to the Geological Survey.

Messrs. Sotze King 金叔初 and Teilhard are elected as new members of the Council in the place of Messrs. C. Ho and J. G. Andersson whose term expires. The other members of the Council are following.

H. T. Chang 章鴻釗	(President 1922)
W. H. Wong 翁文灝	( " 1924, 1926)
C. Y. Wang 王衡佑	( " 1925)
C. Y. Hsieh 謝家榮	( term expires 1928)
L. F. Yih 葉良輔	( " " 1929)
P. L. Yuan 袁復禮	( " " 1929)

**AFTER NOON SESSION OF THE SATURDAY, FEB. 12.**

The meeting was reconvened at 2 o'clock. The president introduced to the Meeting Dr. Sven Hedin the well known Swedish explorer and announc-

ed his election as correspondant member of the Society. Dr. Hedin then gave a short lecture on desert condition of Central Asia. The meeting was particularly well attended for hearing this interesting communication. After that the following papers were read.

P. Teilhard de Chardin and E. Licent : Some observations on the Upper Tertiary and Lower Quaternary beds of N. Honan and S. W. Shansi.

G. B. Barbour, E. Licent and P. Teilhard de Chardin : Geological study of the Nihowan beds, along the Sangkan Ho.

The latter paper was illustrated with lanternslides.

A. W. Grabau : Revised Classification and Correlation of Upper Palaeozoic formations of Europe and Asia.

Y. T. Chao : Stratigraphy of Western Chekiang.

The full paper will be published in the bulletin of the Geological Survey No. 9.

#### ANNUAL DINNER.

Annual dinner was held at 8. p.m. Saturday Feb. 12 in the Hotel du Nord. Over forty members and guests were present at the table. Dr. Wong presided. At the end of the dinner, a number of members and guests were asked to speak including Dr. Sven Hedin; Dr. Houghton of the Peking Union Medical College; Mr. Yiou Chang former director of mines and now President of the Chinese Institute of Mining and Metallurgy; Pere Lèjay of the Zikawei Observatory; Mr. Sotze King of the Peking Natural History Laboratory; Dr. Kummel of the Berlin Museum; Mr. P. L. Yuan and Dr. Grabau of the Geological Survey.

#### MORNING SESSION OF MONDAY FEB. 14.

The following papers were read.

J. S. Lee : Oscillatory transgression and Palaeogeography with lantern slides.

H. S. Wang : The Ancient volcanoes in Hsuan Hua Region.

In this paper the author records his observation on the successive phases of the Mesozoic volcanic eruption; the full study will be published in the bulletin of the Geological Survey.

Y. Akasegawa: Preliminary notes on the structure of Chinese coals, the so-called "Wei-tan" read by title in the absence of the author.

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- C. C. Tien: Geological notes on the stratigraphy of Southeastern Anhui.
- A. W. Grabau: On the occurrence of the Larvae of Ephemeroptera in the Cretaceous beds of Jehol.
- H. T. Lee: A Petrographic study of the "Wurmalkalk."
- C. C. Wang: Geology of Lushan, Kiangsi province.

AFTER NOON SESSION OF MONDAY FEB. 14.

- P. Teilhard de Chardin: On the recent marine beds of Tientsin, and the fresh water underlying formations.
- Sohtsu G. King: On the shells from Tientsin sands, and the Shanghai wells, read by title.
- P. Teilhard de Chardin and E. Licent: On the basal beds of the sedimentary series in S. W. Shansi.
- J. Hata: Brief notes on reddish brown sand formation and terrace deposits in Northern South Manchuria, read by title.
- Burg Tsai: The heredity and habitus of the Mosasaurs.
- S. S. Yoh: On a new Genus of Syringopora-like Coral from the Upper Carboniferous of Chihli and Fengtien Provinces.
- : On a new species of Waagenella from Szechuan Province.
- : On the occurrence of the Lyttonia Fauna in the vicinity of Kwei-Yang, Kwei-chow Province.
- J. S. Lee: On the significance of the variation of the well temperature as observed in the Central laboratory of Peking.
- P. Lajoy: The longitude determination in Shanghai.
- J. G. Andersson: Mammal bones in the peat bog of Pu Lao Ting.
- C. Li: Neolithic sites in South Shansi.

Mr. Li, professor of archeology and anthropology of Tsinghua College announced his discovery together with Mr. P. L. Yuan in Shansi of several neolithic sites from where they have collected many interesting artifacts and other things among which is a silk cocoon.

The President announced that he has received a number of papers which time did not allow him to include in the program of meeting, and he had to content himself by reading by title. They are the following.

- E. Ahnert: Nord-Mandschurien ist ein von den unerforschsten gebieten der Erde.
- G. Cressy: Geology of Shanghai region as revealed by deep wells.



Z. Gherzi: Observation géologique sur le canal de Formose.

C.M. Heanly: Some neolithic sites in Honkong.

P. L. Yuan: Review on the Hongkong neolithic collections.

All the above papers will be printed in the bulletin as they will be available to the board of editors.

In closing the meeting, the president thanked the members for their communicating many important observations which are thus available to geological students.

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# CRUSTAL MOVEMENTS AND IGNEOUS ACTIVITIES IN EASTERN CHINA SINCE MESOZOIC TIME.<sup>1</sup>

BY W. H. WONG

翁文灏

(*The Geological Survey of China*)

Crustal movements in Eastern China in Mesozoic and later times were but little known a few years ago. Researches of the recent years result in various data which permit to form some general idea of these movements. It is the aim of this paper to bring together such data and to examine their significance as to the history of the diastrophisms in this country.

The igneous intrusions and volcanic eruptions are phenomena closely related with the diastrophisms and should be considered at the same time. A first result of this review will be to bring out the importance of the Mesozoic movements which seem to have some particular significance in the Pacific region. Effort will be made to determine the geological age of these and later movements and the accompanied igneous activities. As the diastrophic and igneous phenomena often show various characters according to the regions in which they took place, due attention will be paid in the description to their geographical distribution.

## SUMMARY OF THE MESOZOIC STRATIGRAPHY.

In spite of the frequent occurrence of stratigraphic gaps in the sedimentary record in China, the whole sequence from the Sinian (non metamorphic Pre-Cambrian) up to the Jurassic or in some regions to still higher horizons is remarkably conformable with no or little sign of angular discordance. Principal unconformity occurs above the Jurassic beds at least in many regions. The Mesozoic movement has therefore a great importance in Chinese geotectonics and should be more carefully studied.

The Mesozoic formations and their structural relations in North and Middle China are now better known than in those days when they were indistinctively mentioned under such vague terms as Post-Carboniferous sandstone or Permo-Mesozoic. The following table will summarize the principal sections where structural relations are better understood.

Regions ... ..	Western Hills Peking	Taiung basin Shansi	North Shensi
Authority ... ..	Yih	Wang	Wang
Super formation ... ..	Pliocene & Pleistocene	Basalt	Red Hinnarion clay.

1. This is a part of my paper "Crustal movements in Eastern China" presented at the Third Pan-Pacific Science Congress held in Tokyo, Nov. 1926 accompanied by a tectonic map of Eastern China. But several paragraphs have been revised or expanded and some new ones added in.

Cretaceous	Upper (& middle) Lower	Tiaochishan porph. & Conglomerate.			
Jurassic	Upper... Lower (& middle)	Chiulungshan sand. Mentoukou coal series*	Red & green sand. sh. Upper coal series*	Shensi coal series*	Red cross bed d. sand. Red sand. & thin marl.*
Triassic ... (or Permo Triassic)	...	Hungmiaoling sand.	Red shale, sand. congl.	Fenho red series	
Sub-formation	...	Permo-Carbon coal	Permo-Carbon coal.	Permo-Carbon coal.	
Region	...	East Kansu	S. E. Honan	Shantung	Jehol
Authority	...	Yuan	T'an	T'an	T'an
Super-formation	...	Tertiary red beds.	Younger Tertiary	Kuanchang congl. (Eocene)*	Late Tertiary clay
Cretaceous	Upper (& Middle) Lower	Liupanshan sh.*	Tuff-congl.	Chingshan, & Laiyang & Mengyin sand. & tuff congl.*	Porphyry and tuff conglomerate coal bearing sand. & sh.*
Jurassic	Upper Lower (& Middle)	...	Coal Series*	Santai Sandstone Shangkunlun series*	Coal Series
Triassic or Permo Triassic)	...	...	...	Hsiakunlun sand. quartzose sand.	
Sub-formation	...	Palaeozoic	Wutai schist	Palaeozoic	Sinian, Archean

The asterisk\* in the table marks those formations which have yielded fossil evidence. The rich fossil flora of the Mesozoic coal series have not yet been completely studied. See F. F. Mathieu L'age geol. des charbons de la Chine Ann. Soc. Geo. Belg. t. XLV 1922, p. 211.

The Cretaceous age was assigned to the tuff-conglomerate of Shantung and some similar beds in Northern Shansi and Western Fengtien, chiefly on the basis of the fossils described in the following papers:

A. W. Grabau, Cretaceous fossil from Shantung; Cretaceous fossils from N. China; Contribution to the fauna of the Kueichow formation of Central China.

T. C. Chow, A preliminary note on some younger Mesozoic plants from Shantung all in Bull. Geol. Surv. China No. 5, pt. 2, 1923.

Lower Cretaceous fossils were formerly known in Szechuan through Frech and Yokoyama.

The Tiaochishan formation was considered by Yih as Upper Jurassic on the evidence of a few imperfect fossils. Its petrographic character as well as the structural relation seems to leave no doubt as to its equivalency with the other Cretaceous formations. The same is true for the porphyry-tuff formation in Hupeh and S. Kiangsu. This opinion is confirmed by H. C. T'an who has a wide field experience on these formations, see his paper on the tuff-conglomerate formation in China. Bull. Geol. Soc. China Vol. No. 2, pp. 149-156.

Region .. .. .	Yangtze Gorge	S. E. Hupeh	S. Kiangsu	W. Chaktang
Authority .. .. .	Lee Hsieh and Chao	Hsieh, Liu	Liu	Liu & Chao
Super-formation ..	Tungshu sand, (early Ter.?)	<u>Red Series (?)</u>	<u>Red beds</u>	<u>Red beds</u>
Cretaceous { Upper (& Middle) Lower	Kueichou sand. & sh.*	Lingsiang Porphyry & <u>conglomerate</u>	Porphyry & tuff.	Porphyry, Kien- teh sand.*
Jurassic { Upper Lower (& Middle)	Hsiangchi coal series.*	Wuchang coal series*	Tsungshan sand. & conglm.	
Triassic ... .. (or Permo- Triassic)	Patung sh. & <u>limestone.*</u>	Tayeh lime- stone* (Permo- triassic)	Thin bedded limst. (Id.)	Permian lim.*
Sub-formation ...	Wushan limest			

In the above table, the straight line ——— marks disconformity and the curved line ~~~~~ unconformity. Vertebrate fossils including chiefly reptiles have been found from different localities but have not yet been completely worked out. Therefore the age determination of these continental deposits is yet to be considered as provisory. But from the evidence already available it may be assumed that the age assigned to the different formations is essentially correct and there is enough observation on their relative position to serve to tectonic interpretation.

From the above table, it can be seen that the late Palaeozoic beds are always regularly succeeded by the early Mesozoic sandstone usually of rather coarse grain and denoting deposition of arid climate. After an important interval of time corresponding chiefly to the late Triassic, there was a time of moist climate with abundant vegetation resulting in the formation of the Liassic or early Jurassic coal bearing series. The latter is generally succeeded by a quiet deposition of red or green sandstone and shale formed in changed conditions which did not allow development of coal seams. All these deposits were formed in localized continental basins between which there existed rised ranges or plateaus. In the early Cretaceous, the conglomerate formation becomes a predominant feature and the volcanic rocks are extensively developed.

## PRE-JURASSIC MOVEMENT.

The disconformity at the base of the Lower Jurassic coal series is a small one but distinct and general enough as to have been noticed wherever careful observation has been made. It comes out especially clearly from description and maps by Yih<sup>1</sup>, Wang<sup>2</sup> and Hsieh and Chao<sup>3</sup> in the Western Hills, the Tatung basin, North Shensi and the Kueichou basin in W. Hupeh respectively where the pre-Jurassic erosion has either produced an irregular contact between the Jurassic and the Triassic beds or resulted in the partial or complete elimination of the latter. Thus the Jurassic coal series may directly overly older formations varying in age from the Wutai system to Permo-Triassic. More generally however the Triassic is not completely eroded, and then it is always in parallel position with the Jurassic, no angular discordance between them has ever been recorded.

The relation above outlined between the Triassic and Lower Jurassic beds suggests a movement of no negligible importance at that interval. It was not an orogenic movement, but it involved very gentle folding in some regions and monoclinal warping or block faulting in others. The conditions in the Western Hills of Peking where gentle folding probably occurred before the deposition of Mentoukou series have been ably summarized and illustrated by Prof. Barbour.<sup>4</sup> The folding becomes only evident where erosion has cut deep enough on the anticlinal parts of that time. In the Mentoukou and Chiulungshan area or other main Mesozoic basins such as North Shensi, Tatung coal field, Kueichou coal field, etc. very gentle folding probably also took place without complete or permanent emersion at the end of Triassic though the folding must not be very intense and nowhere has been observed any evidence of great tangential stress.

## PRE-CRETACEOUS MOVEMENT, THE YEN SHAN MOVEMENT.

More important is the movement preceding the Lower Cretaceous. As is shown by the above stratigraphical table there is in most cases a clear unconformity below the formations to which this age is assigned though some

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1. Yih, L. F. Geology of Hsishan or Western Hills of Peking, Mem. Geol. Surv. China A. I, 1920, p. 24.
  2. Wang, C. C. The coal field of Tatung. Bull. Geol. Surv. China No. 3, 1921, Pl. II and on the stratigraphy of Northern Shensi. Bull. Geol. Soc. China Vol. IV, 1923 p. 60.
  3. Hsieh, C. Y. & Chao, Y. T. Geology of Ichang and neighbouring districts in Western Hupeh. Bull. Geol. Surv. China No. 7, 1925 p. 54.
  4. G. Barbour—Preliminary observations in the Kalgan area. Bull. Geol. Surv. China, Vol. III, 1924, p. 154.

of the authors have had some hesitation to affirm so. The difference of dip between the Chiulungshan and the Tiaochishan series<sup>1</sup> in the Western Hills of Peking may not be very marked, but there is little doubt in my mind that important deformation and erosion took place prior to the deposition of the Tiaochishan series. This pre-Cretaceous unconformity becomes even still more marked in the eastern extension of the Tsinling range in southern Honan<sup>2</sup> where the Cretaceous tuff-conglomerate with a dip angle of about 20 degrees discordantly overlies the Jurassic coal series which is strongly metamorphosed, steeply inclined or sometime dressed in vertical position. Unconformity of the same age exists in the lower Yangtze Valley as is testified by observations in south eastern Hupeh and south Kiangsu. In the latter province, the Tsungshan sandstone near Nanking<sup>3</sup> dipping at over 30 degrees, is overlaid by the porphyry and tuff formation dipping at less than 20 degrees. The Upper Jurassic age given by Mr. Liu to the latter formation without fossil evidence has no doubt to undergo the same adjustment as the Tiaochishan series near Peking and to be lifted to the Lower Cretaceous. The pre-Cretaceous unconformity is therefore of rather general occurrence in eastern China though it is found at very different degree in different regions. It is probable that most of the folded anticlines and basins of Palaeozoic and Mesozoic strata east of Kansu and Szechuan are formed by this movement. It is too young in age to be still correlated with the Hercynian orogenic period and too old to be Himalayan, and yet it has an influence on the local structure of eastern China predominant enough as to be known under a special name. As it was first recognized in the Western Hills near Peking where stratigraphic evidence has been better worked out, it will be referred to here-after as the Yenshan<sup>4</sup> movement.

1. Mr. Yih (op. cit. p. 20-30) felt rather uncertain about the unconformity below the Tiaochishan series and concluded to a deceptive conformity. Angular discordance can be however distinctly recognized on the east and the south of Miaofenshan (op. cit. Pl. XIII) where Mr. Yih drew unnecessary faults. The same interpretation may hold good for the Tiaochishan series in the Tahuichang and Toli area. Besides, the inclusion of limestone and granite pebbles at the base of this series is an indication clear enough of the important deformation and erosion before its deposition. The remarkable metamorphism of the Mentoukou and Chiulungshan series may be also partially explained by the pre-Tiaochishan folding.
2. T'an, H. C.—Mesozoic formations in south eastern Honan and their bearing on the date of Tsinling folding. Bull. Geol. Soc. China Vol. IV. 1923 p. 252.
3. Liu, C. C.—Preliminary report on the geology and mineral resources of Kiangsu Mem. Geol. Surv. China A IV, 1924 Chinese text p. 26.
4. Yenshan (燕山) is the name usually given to the ranges north of Peking in Chinese geography.

In Western Shantung, T'an<sup>1</sup> observed no unconformity below the Menyin series which overlies the Hsiakunlun series of widely variable thickness. In Eastern Shantung the Cretaceous formation directly covers Pre-Cambrian metamorphics. It seems that the Shantung block has been especially resistant to the movement of folding ever since the Sinian time and has also escaped the Yenshan folding.

The Yenshan folding becomes probably also much reduced toward the Upper Yangtze so that the Kueichou series (restricted sense) is seemingly continuous with Hsiangchi series although they are separated by a not unimportant interval of time, nor has any unconformity within Mesozoic strata been reported from the red begin of Szechuan.

The age of the Yenshan movement now in question is well limited between the Chiulungshan and the Tiaochishan series in the Peking Western Hills. If the reference of the above named formations to Lower Jurassic (Or including Middle Jurassic) and Lower Cretaceous respectively is correct we have to conclude to a quite important crustal movement of Upper Jurassic age.

#### DISTRIBUTION OF THE YENSHAN MOVEMENT

Some definite orogenic zones of the Yenshan movement can be now roughly traced. First is the eastern extension of the Tsinling (秦嶺) range. We have already mentioned the marked unconformity observed by Mr. T'an below the tuff-conglomerate in south-eastern Honan. Further east in northern Anhoei<sup>2</sup> the same beds have been observed unconformable above folded and metamorphosed strata. Therefore these mountain ranges between the Huaiho and the Yangtze valleys which are variously called Funiu, Tungpei, Tapiéh or Huaiyang (Waiyang) ranges and usually considered as the eastern extension of the Tsinling range seem to have been strongly affected by the Yenshan orogenic movement.

Opinion has varied widely among geologists as to the exact age of the orogenesis in the Tsinling range. Both Richthofen and Loczy have observed in south Shensi and Kansu bordering the Szechuan basin sections where Mesozoic strata lie in marked discordance on folded and eroded Palaeozoics. They concluded therefore to the Hercynian age of the Tsinling

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1. T'an, H. C. New research on the Mesozoic and early Tertiary deposits in Shantung. Bull. Geol. Surv. China No. 5 pt. II 1923, p. III. Sc.
  2. Liu, C. C. & Chao J. C. Preliminary report on the geology and mineral resources of Kiangsu Mem. Geol. Surv. China, A IV, 1924 p. 8 also geol. map of N. Anhoei between Hucshanhsien and Chienshanhsien Bull. Geol. Surv. China No. 1, 1919.



orogenesis. Willis and Blackwelder<sup>1</sup> assigned the Tsinling movement to between the Permo-Triassic and Middle or Upper Jurassic because according to their observation the unconformity lies between their "Kueichow series" and a formation which they correlated with their Shihchuan sandstone. Now what Willis called Kueichou series in the type region of Kueichou in Western Hupeh has proved by recent studies<sup>2</sup> to be divisible at least into three terms the Patung, the Hsiangchi and the restricted Kueichou series<sup>3</sup>. The so-called Kueichou series of Willis in the folded range of Tsinling range most probably corresponds to our coal bearing Hsiangchi series. Shihchuan sandstone is very likely the same as what is now called the Tunghu sandstone believed to be of early Tertiary age if not equivalent to the Kueichou series in the restricted sense. Thus interpreted, Willis' section seems well in accord with the Upper Jurassic age of the folding. It is yet difficult to know how far the Tsinling folding of Hercynian age, as observed by Richthofen and Leczy in more western section, extends to the east. The view is commonly held by geologists that it extends to the mountain ranges in southern Honan and northern Anhoei. It may be true then that these ranges have been folded a first time by the Hercynian movement and again a second time by Upper Jurassic or Yenshan movement. In the regions where Palaeozoic strata are strongly folded and overturned as in the Shunkung shan coal field<sup>4</sup> of northern Anhoei, it is impossible to ascertain whether the folding is due to the first or second movement in the absence of Cretaceous deposits. On the other hand, in the regions where the pre-Cretaceous unconformity has been observed there are no undoubted Palaeozoic rocks. But the existence of the Yenshan folding in south Honan seems to have been proved beyond doubt by T'an's observation.

Another zone of strong folding by the Yenshan movement, though

1. Willis B. Research in China Vol. II 1907 pp. 295-300.
2. Lee, J.S. Geology of the gorge districts of the Yangtze valley Bull. Geol. Soc. China Vol. III 1924 p. 82 also Hsieh C. Y. & Chao Y. T. Geology of Ichang and neighbouring districts in western Hupeh Bull. Geol. Surv. China No. 7. 1925.
3. It seems to me always a bad practice in stratigraphical terminology to create a name for a group of strata and then restrict or extend it to a smaller or larger group. It makes the term confusing unless lengthy explanation is added. In the present case, the new Kueichou series i. e. this group of strata above the Hsiangchi coal series and containing Cretaceous shells, may be probably better called Tsikuei series. Tsikuei 獅歸 being the new district name of the same city which was called Kueichou in Willis' time.
4. Wang, C. C. The geology of the S. W. part of Huaiyuan hsien, Bull. Geol. Surv. China, No. 7. fig. 3 in Chinese text.