地質彙報第六號
附圖一插圖七

山東章邱煤田地質

安特生著

民國十三年十二月
農商部地質調查所印行

章邱煤田地質

安特生著
葉良輔節譯

所謂章邱煤田、其範圍並不限於章邱。其西部隸歷城、其中部爲章邱、其東部屬淄川。民國八年、前往調查、自淄川之磁塢起、以迄章邱之葛店止、計測煤田露頭約一百五十華里。

地層

煤系屬二疊石炭紀、整合於奧陶紀灰岩之上。其底部爲紅黃色頁岩、厚約二十公尺、其上爲含化石之石灰岩、厚約十公尺。復上若干尺、又見化石灰岩一層、厚一二公尺、兩層灰岩之間、似有煤一層(見圖一)。煤系底部之岩層、實爲煤田之導線也。煤系頂部、卽爲粗砂岩所覆。煤系詳情大致、可見於附表A及B。

構造

自章邱縣西南至文祖鎭、有一斷層崛起、而分煤田爲東西兩區。東區東部又遇斷層、該斷層之東。卽爲淄川博山煤田。章邱煤田東區、構造整齊、一致傾向東北(見插圖二)。章邱中部斷層線之北端、似已成爲拗褶(見插圖三—六)。沿斷層線、小窰頗多、但構造紛亂、決無開採價值。章邱西區煤田、構造殊不一致。

煤田價值

章邱煤田、有膠濟鐵道橫貫中央、地近鐵道幹線、交通利便、似與該煤田以特別利益者。實則該路線於章邱煤田、有間接之不利。按膠濟路未築之前、章邱土窰甚多、自膠濟路建築後、反爲距離較遠之淄川博山煤田所戰勝、土窰相繼倒閉。再章邱煤田東區、構造簡單、應啟發較易、惜曾經德人鑽探、乃知結果不良。加以章邱之煤、含灰百分之二十五、較諸博山之煤含灰祇百分之十一者、瞠乎後矣。故有志經營章邱煤田者、宜再試較深之鑽

探、與詳細之調查也。

REPORT ON THE CHANG CHIU COAL FIELD IN SHANTUNG

With 1 Map and 7 Figures

By J. G. Andersson

Introduction. This coal field was surveyed by me in cooperation with Mr. S. H. Tsao, Mining Expert attached to the Financial Commissioner of Shantung, in the early part of 1919. All statements about working mines refer to the conditions in the beginning of 1919.

Location. The coal field which has been given the name *The Chang Chiu Hsien feld* in fact extends over three districts, namely Li-Cheng Hsien in the west, Chang Chiu Hsien in the centre and Tsu Chuang Hsien in the east. Within this area I have followed and surveyed a continuous outcrop of the coal series for a distance of 150 li from Yao Wu (磯 塢) in Tzu Chuan Hsien to Ku Tien (莒 店) in Li Cheng Hsien.

Stratigraphy. The coal series is of Permo-Carboniferous age and rests upon the Ordovician limestone, as is the case in general in northern China.

The bottom of the coal series was studied south of the Tung I company's mine in Chang Chiu Hsien and there was found to consist of red and yellowish brown shales with a thickness of about 20 meters.

Above this series follows a bed, 8-10 m. in thickness, of marine limestone with Crinoids, Brachiopods and Trilobites.

Somewhat higher up there is another bed of marine limestone, 1-2 meters thick with Fusulina, Crinoids and Corals. There is at least one coal seam below this limestone. These stratigraphic conditions are shown also by fig. 1 from a place at the railway near S.S.W. of Ming Shui.

The contact towards the underlying Ordovician limestone as well as the two limestones within the lowest part of the coal series are invaluable leading horizons. In the same way the coal series is overlaid by a very conspicuous, thick bed of millstone grit which often forms marked ridges, pitted by numerous quarries.

The detailed stratigraphy of the productive part of the coal series is not clearly available by surface survey, but some information of this kind, probably not altogether reliable, may be gathered from the two underground sections (appendices A and B) communicated by the T'ung I Co. and the T'ien Yuan Co. coal mining managers.

Tectonic features. From a tectonic point of view the field may be subdivided into a western and an eastern part, separated by a big fracture line running from Wen Tsu Chen northwards to a place S.W. from Chang Chiu city.

The eastern part of the field is to the east bounded by an equally large fracture line which abruptly cuts off the coal outcrop to the east and forms the natural boundary between the Chang Chiu Hsien coal field in the west and the Tsu Chuang—Po Shan coal field in the east. In this eastern half of our field the tectonic conditions are extremely simple and constant with a gentle and regular dip to the N.E. as shown by figure 2.

The central fracture line running from Wen Tsu Chen northwards, which has been mentioned above, was studied by me in several places. Figure 3 gives the conditions at a place about 7 li north from Wen Tsu Chen. Here it is evident that the earth-movement has taken the shape not of a fault but rather of a very short and abrupt flexure.

Figures 4-6 show the conditions south of Li Chia Fu, fig. 4 is from the south side of the village, fig. 5 is 1.5 li further to the South, and fig. 6 another li in southern direction. Figures 4 and 6 seem rather to support the idea of a fault, but figure 5 is more in favour of a flexure fold.

Along this fracture line there are numerous old native pits, but from the point of view of modern development this zone is valueless because of the strong disturbances.

The western part of the field, to the west of the large fracture line just described, exhibits much more irregular tectonic features than is the case with the eastern half.

As shown by fig. 7 the part of the field at Pei Ts'o Fan (北曹范) forms a gentle syncline, but in detail there are many irregularities.

Further N.W. the conditions become more obscure and the coal series is mostly covered by Cenozoic deposits. The last outcrop which I saw in westerly direction is a small hill at Li Chia Chuang (李家莊), north of the railway where the millstone grit is exposed.

Prospects for future development of the field. With reference to communications the Chang Chiu Hsien coal field is singularly well situated. The Tsinanfu-Tsingtao railway runs across the outcrop of the coal in two sections of the field and for the rest in a short distance to the north of the outcrop. The country is mostly open and the existing hills would not offer serious obstacles for the construction of branch lines to practically any part of the field.

In fact, this exceptionally favourable situation close by an existing trunk line forms one of the several *indirect* indications that this field offers *less* favourable prospects than the nearby Tsu Chuang—Po Shan field.

There is all along the 150 li of continuous coal outcrop in the Chang Chiu field a nearly unbroken chain of old pits proving that the field was formerly worked extensively in the old native way, probably mostly for the purpose of supplying the local demand.

Then came the construction of the Tsinanfu—Tsingtao line with its branch line down to Po Shan. Modern development with its possibilities of long distance competition set in and the result seems to have been that most of the Chang Chiu mines closed down, whereas we have had to witness a bustling development of the Tsu Chuang—Po Shan field by the big German constructed mines at Hung Shan and a very large number of smaller, semi-modern Chinese mines near Po Shan,

It is a significant fact that Po Shan coal, but no local coal was at the time of my visit, offered for sale at Ming Shui in the very centre of the Chang Chiu field.

Another exceptionally favourable feature which indirectly causes doubt about the value of the field is the regular tectonic structure of the eastern half of the field from Ming Shiu eastwards.

When standing at the top of the hill-range south of Wang Tsun and viewing in a splendid panorama the wonderfully regular outcrop of the coal measures both east and west, I felt that I had before me one of the most remarkable coal lands which I had ever seen. But later on when walking along the actual outcrop I found mostly abandoned pits or at the best some few working mines of some times rather doubtful prospect.

We were told by the local population that the Germans had undertaken some borings within this field, and it seems likely that they found this prospect less favourable and consequently concentrated their efforts at Tsu Chuang Hsien.

We were also told that the seams in this field contain very numerous partings of shale which make the working of those seams difficult.

Another factor to be taken into consideration is the experience gained that no good coking coal is produced in this field, whereas good coke is obtained from the Po Shan coal.

In the appendices D and E are collected analyses from the Chang Chiu and the Po Shan fields. From the comparison between these two tables one fact at once becomes apparent, namely the much higher ash content in the Chang Chiu coal, 25.7%, as compared with 11.1% as an average of the Po Shan coal. It is true that the difference partly may be due to the fact that the coal is mined with improved method in the Po Shan field and that for this reason a better product is obtained. But it is by no means improbable that the coal of the Po Shan field is in itself better than that of the Chang Chiu field. The more we become familiar with the coal fields of China, the more evident it becomes that very foundamental variations of the thickness, structure and quality of the seams within nearby fields of the same coal series are to be counted with.

The above considerations are intended to caution the investor who takes interest in this coal field. But it is by far not my idea that the field is not worth further and more detailed investigation. We now know the features of the field in its broad outline, and it would be easy to draw up a definite plan for further prospecting work, in the first lines some deep-borings, as soon as it is known which part of the fields is to become the object of such more detailed operations.

APPENDIX A.

Section from the T'ung I Co.'s mine, Chang Shan Ti, Chang Chiu Hsien.

黃土	Loess	6	feet
黃砂石	Yellow sandstone	14	,,
紅皮黃沙石五叠	Ferruginous sandstone	30	,,
黑砂石	Black sandstone	30	,,
第一層煤厚	First coal seam	0.6	,,
黑砂石	Dark sandstone	6	,,
黃砂石	Yellow sandstone	26	,,
第二層煤厚 (中間夾猪肝色石七寸)	Second coal seam (a fire-clay bed in it 7")	1.7	,,
黃砂石	Yellow sandstone	16	,,
青炸石 (內含炭質)	Shaly limestone (containing carbon)	1.9	,,
第三層煤厚	Third coal seam	1.9	,,
硯瓦石	Slate	16	,,
第四層煤厚	Fourth coal seam	3.1	,,
磚頭末石	Fine sandstone	8	,,
白砂石(灰色)	White sandstone (interbedded with gray)	4	,,
硯瓦石	Slate	4	,,
黃砂石(十字紋)	Yellow sandstone (with crossing fracture lines)	8.6	,,
黑色苗泥	Dark shale	0.6	,,
黃砂石	Yellow sandstone	1.4	,,
磚頭末石(黑色)	Fine dark sandstone	0.5	,,
黃砂石	Yellow sandstone	2	,,
黑砂石(軟的)	Soft dark sandstone	0.7	,,
青砂石	Dark sandstone	4	,,
千層板	Shale	3	,,
黃砂石	Yellow sandstone	2.6	,,
硯砂石	Slate	2	,,
青砂石	Dark sandstone	7	,,
黃砂石(十字紋)	Yellow sandstone (with crossing marks)	6	,,
青砂石內含石蛋	Dark sandsfone containing pebbles	2	,,
第五層煤厚	Fifth coal seam	1	,,

灰色硯瓦石	Gray slate	2	feet
青砂石	Dark sandstone	10	,,
黃砂石	Yellow sandstone	4	,,
硯瓦石	Slate	2.2	,,
第六層煤厚	Sixth coal seam	4	,,
青砂石	Dark sandstone	6	,,

APPENDIX B.

Section of the first shaft of Tien-yuan Co, at Lao Po Yia, Fu Tsun Chin, Chang Ch'iu Hsien.

黃土	Loess (or Huang Tu)	40	feet
紅土	Loess (or Huang Tu), red clay	12	,,
河流子	Pebbles	16	,,
黃沙	Yellow sandstone	4	,,
大黃竪石	Thick yellow sandstone	16	,,
假山石	Chia Shan stone	72	,,
燦白石	White limestone	36	,,
黑硯瓦	Black shales	0.96	,,
薄炭	Thin coal seam	0.24	,,
青渣石	Shaly limestone	0.48	,,
硯瓦石	Shale	16	,,
腰拴石	Yao Chuan stone	8	,,
硯瓦石	Shale	0.96	,,
薄炭	Thin coal seam	0.24	,,
硯瓦	Shale	4	,,
黑硯石	Black shale	0.96	,,
薄炭	Thin coal seam	0.24	,,
青渣	Shaly limestone	0.48	,,
硯瓦	Shale	4	,,
黑硯瓦	Black shale	2.24	,,
小炭	Thin coal seam	0.24	,,
硯瓦	Shale	0.48	,,
小炭	Thin coal seam	0.24	,,
硯瓦	Shale	8	,,

黑硯瓦	Black shale	0.96	,,
小炭	Thin coal seam	0.24	,,
青渣	Shaly limestone	0.48	,,
硯瓦	Shale	8	,,
小炭	Thin coal seam	0.24	,,
青渣	Shaly limestone	0.48	,,
硯瓦	Shale	8	,,
黑硯瓦	Black shale	0.96	,,
小炭	Thin coal seam	0.24	,,
青渣	Shaly limestone	0.48	,,
硯瓦	Shale	8	,,
小炭	Thin coal seam	0.24	,,
青渣	Shaly limestone	0.48	,,
小炭	Thin coal seam	0.24	,,
硯瓦	Shale	4.	,,
大炭	Thick coal seam	4.24	,,

APPENDIX C.

List of pits working in March, 1919

In Tsu Chuan Hsien:

1. Name of village: 抬頭崖 T'ai T'ou Yai
   Name of mine: 人和公司 Jên Ho Company
   Name of owner: 丁昌燕 Ting Ch'ang Yen

There were 4 shafts, 40-50 feet deep. Only one seam, 1 foot thick was worked; deeper was another seam 2 feet thick. Used windlass and man-power for hoisting. (Note. At this mine we were informed that there were 3 working shafts at Tz'u Yao Wu (磁窯塢) and 2 others 3 li S.W. from Chang Li Chuang (張李莊). These pits were not visited by us.)

2 Village: 張家莊 Chang Chia Chuang
   Owner: 丁季臣 Ting Hsiu Ch'ên

Here 4 pits, two were 50 feet, one 60 and one 80 feet. One seam, 2 feet thick.

Daily production 130 baskets (1 basket 120 catties). Analysis No. 2. Used windlass and man-power for hoisting.

3. Village: 賀家莊 Ho Chia Chuang
Mine: 人和公司 Jên Ho Company

4 shafts, 50-60 feet, no coal.

Used eight horses for hoisting.

In Chang Chiu Hsien:

3. Village: 長山地 Ch'ang Shan Ti
Mine: 同益公司 T'ung I Company
Owner: 毛德榮 Mao Tê Jung
Owners address: 德縣 Tê Hsien

In appendix A is given a table of the succession of strata in this place. This table, communicated by the manager of the mine, is not based upon actual observation, but merely upon information collected from native miners.

Depth of the shafts, 250 feet. No 6 seam is worked in 236 m. depth. (Note. Here was installed a steam-hoist (Tientsin pattern). Pump had also been used but was out of working order, waiting for a better American pump. For the time being water was carried away by hoisting). Analysis No. 1.

4. Village: 上高莊 Shang Kao Chuang
Mine: 仁和義 Jên Ho I
Owner: 丁昌燕 Ting Ch'ang Yen

Mining operations begun in 11 moon of 7th year e R.

Now sinking two shafts, at the time of our visit 27/3 one 40 feet, one more than 30 feet, coal not yet reached.

5. Village: 小楊莊 Shao Yang Chang (4 li W.N.W. from Ming Shui)
Mine: 華興公司 Hua Hsing Company
Owner: 管象易 Kuan Hsiang I

3 shafts. Only one of them, 60 feet deep, reached a thin coal seam less than one foot.

This pit had been worked 1918, but after three months the work was abandoned because of impossibility of keeping the mine dry from water.

Here had been installed the usual Tientsin machinary for hoisting. The boiler was left standing unprotected.

6. Village: 牧場澗,靴筒疙 Mu Ch'ang Chien, Hsüeh T'ung Ti
Mine: 天源分公司 Tien Yüan branch Company
Owner: 石寶三 Shih Pao San

Here was shaft sinking just begun at the time of our visit (1/4)

7. Village: 文祖鎮,彭家地 Wên Tsu Chên, P'êng Chia Ti.
Mine: 泰豐公司 T'ai Fêng Company
Owner: 李涵青 Li Han Ch'ing.

This mine was opened in 1918.

Nine shafts: five shafts still sinking, four had reached the coal, one was 170, one 124, one 126, and one 153 feet deep.

Only one seam, thickness about 2 meters, with one parting, about 10 m. thick.

An experiment had been made to produce coke from this coal, but the result was very poor, with pieces of shale visible in the coke.

Out of the whole production only 10% was lump coal, all the rest small coal.

The daily production was 1 140 baskets of 130 catties.

A 15 tons carload of this coal was sold in Ming Shui at $85 and in Tsinanfu at $110.

Had hoisting machinary of the Tientsin pattern.

Analysis No. 4.

8. Village: 三元莊,馬家林 San Yüan Chang, Ma Chia Lin
Mine: 裕通公司 Yü T'ung Company
Owner: 燕雨辰 Yen Yü Chên

Three shafts, one 120 feet still sinking, the two others which are 140 feet deep had reached a three feet seam.

Daily production 500 baskets of 400 catties.

Percentage of lump 10%

Picked lump was sold in Tsinanfu at $170 for a 15 ton carload. Corresponding price of average coal $126. Hoisting machinery of Tientsin type.

Analysis No. 3.

9. Near 月宮莊 Yüeh Kung Cuang
Name of mine: 天源公司 Tien Yüan Company

These 10 small seams (see appendix B, according to communication by the manager) in addition to the main seam, nearly 5 feet thick which was worked in 100 feet depth. Smoking coal, not coking.

The coal is transported by wheelbarrow 25 li to Sao Yuan railway station. A 15 ton carload is sold in Tsinanfu at $130.

Hoisting machinary of Tientsin type.

Analyses No. 5-8.

APPENDIX D.

List of coal samples from Chang Chiu Hsien coal field.

No. 1 Shantung 長伸地 Small coal seam No. 6 28/3 19

No. 2 ,, 張家莊 人和公司 丁秀臣 Averege sample from 80 feet pit 29/3 19

No. 3 ,, Chang Chiu Hsien 王元莊,馬家林 裕通公司 average of coal 1/4 19 J. G. Andersson.

No. 4 ,, 文祖鎮 彭家地 泰豐公司 Averang of coal 1/4 19

No. 5 ,, Chang Chiu Hsin 天源公司 No. 1 Average of coal 1/4 19

No. 6 ,, ,, ,, ,, 2 ,,

No. 7 ,, ,, ,, ,, 3 ,,

No. 8 ,, ,, ,, ,, 4 ,,

Analyses of coal samples from the Chang Chiu Hsien coal field.

No.	Nature of coal	H_2O%	V.M.%	Coke%	Ash%	Colour of ash	S%	C.P.
1	Coking	0.58	10.94	88.48	21.74	gray	0.70	6380
2	Non-coking	0.86	7.90	91.24	29.13	,,	—	5390
3	Coking	0.51	11.67	87.82	35.20	Light-gray	0.25	5280
4	,,	0.45	14.14	85.60	19.54	flesh	0.43	7040
5	,,	0.41	12.22	87.38	29.79	gray	0.36	5940
6	,,	0.46	13.08	86.46	41.20	,,	0.174	5390
7	,,	0.40	13.22	86.38	18.00	,,	0.350	6820
8	,,	0.44	13.50	86.06	13.69	,,	0.344	6490

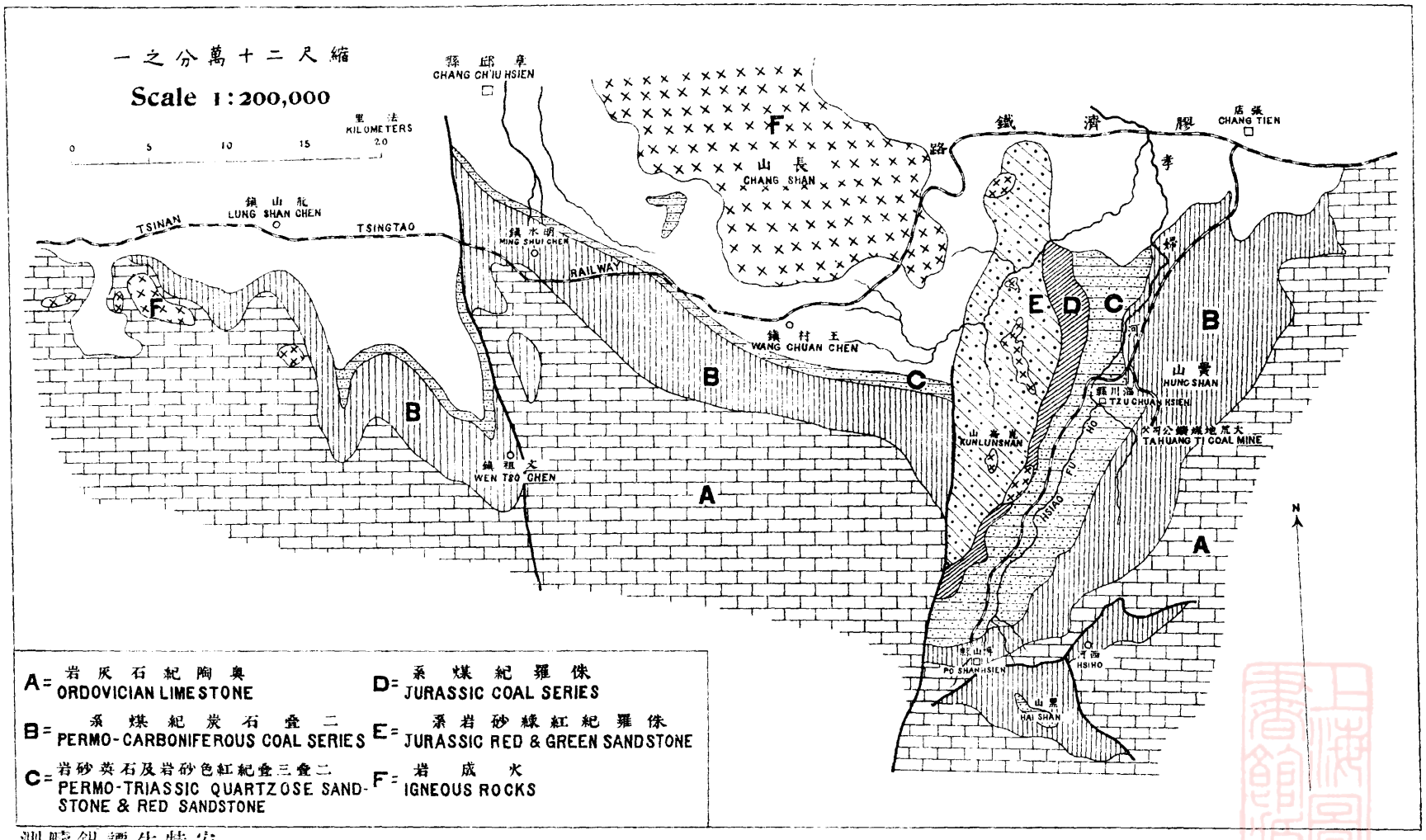
APPENDIX E.

Analyses of coal samples from the Po Shan coal field.

	H_2O%	V.M.%	Ash%	Colour of ash	Nature of coal	S%	C.P.
長光地吉成公司 (大石炭)	1.13	13.57	23.88	brown	coking	1.52	6490
黑山信成公司 (大段石炭)	0.74	16.96	10.85	white	"	0.57	7370
長光地吉成公司 (小石炭)	0.98	17.01	3.25	brown	"	1.08	7700
黑山信成公司 (小段石炭)	0.63	18.15	7.92	whitish brown	"	trace	7260
悅昇公司 (黃石炭)	0.69	12.90	11.36	brown	"	0.09	6820
西河興業公司 (油性炭)	0.69	12.17	5.77	"	"	trace	7380
星聚公司 (大黃石炭)	0.56	15.88	14.34	"	"	0.29	6710

山東淄川博山章邱煤田地質圖

THE GEOLOGICAL MAP OF THE TZUCHUAN-POSHAN-CHANGCHIN COAL FIELDS. SHANTUNG PROVINCE.



A= 岩灰石紀陶奧 ORDOVICIAN LIMESTONE

B= 系煤紀炭石叠二 PERMO-CARBONIFEROUS COAL SERIES

C= 岩砂英石及岩砂色紅紀叠三叠二 PERMO-TRIASSIC QUARTZOSE SANDSTONE & RED SANDSTONE

D= 系煤紀羅侏 JURASSIC COAL SERIES

E= 系岩砂綠紅紀羅侏 JURASSIC RED & GREEN SANDSTONE

F= 岩成火 IGNEOUS ROCKS

測畸錫譚生特安

By J. G. Andersson and H. C. Tan

Fig. 1. Section through the lowest part of the coal series SSW. from Ming Shui (明水).

Fig. 2. Section through the coal series S. of Wang-Tsün 王村

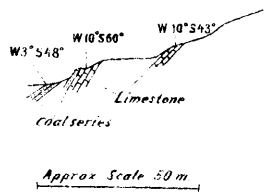


Fig. 3. Section through the flexure 7 li N from Wên-Tsu-Chên (文祖鎮)

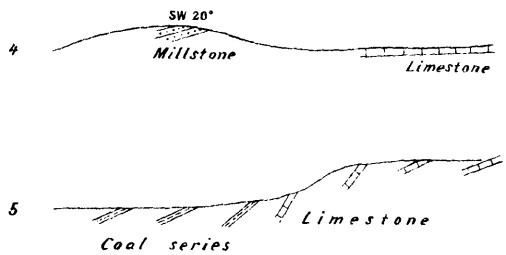


Fig. 4-6 Sections through the flexure, S of Li-Chia-Fu 李家埠

Fig. 7 Section through the syncline of Pei-Tsê-Fan. 北曾范

(From Bulletin of the Geological Survey of China, No. 6, Dec. 1924)

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