

# *Dolomite Deposits in the Districts of Ta-shih-chiao and Hai-cheng, Manchuria*

Keiji UETANI

## **I. Introduction**

Carbonate rocks, whose age is usually Paleozoic or older, are abundant in southern Manchuria, and are defined as dolomite. The MgO content of these rocks has a tendency to increase with age.

The largest dolomite bed in Manchuria belongs to the Archean Liaoho system. It extends between Ta-shih-chiao railway station on the Lien-ching line (Ta-lien to Hsin-ching) and Tsao-ho-kou railway station on the An-feng line (Mukden to An-tung) for a distance of about 150 km with a considerable width, trending N70°E.

The present paper deals only with the western half of this dolomite bed, because little is known about the eastern half although it seems quite similar to the western half in general geology and mode of occurrence.

The western half of the dolomite stretches from Niu-hsin-shan to Hei-shan, for some 70 km, roughly parallel to the magnesite deposits which are described by the author in a separate paper.

## **II. Location and Transportation**

The dolomite is exposed widely in three counties, Kai-ping, Hai-cheng and Liao-yang, of Mukden Province. It extends from Niu-hsin-shan, 7.5 km southwest of Ta-shih-chiao station, to Hei-shan for about 70 km with a width 4 km, passing through Sheng-shui-ssu, Ta-ling, Ching-shan-pai, Chin-chia-pu-tzu, Yang-chia-tien, Hsi-lao-niu-pai, Ma-ma-chieh and Chi-tung-yu.

The area of dolomite deposits is bounded on the west by the Lien-ching Railway on which nine stations are located, namely, Ta-ping-shan, Ta-shih-chiao, Fenshui, Ta-shan, Hai-cheng, Nan-tai, Tang-kang-tzu, Chien-shan and An-shan, from south to north. A branch railway starts from Ta-shih-chiao and reaches Ching-shan-pai, passing through Chen-chia-pu-tzu, Sheng-shui-ssu and Ping-erh-fang stations. Besides this, a light railway of the South Manchuria Mining Co. runs between Sheng-shui-ssu and Hsiao-sheng-shui-ssu for some 2 km, and another

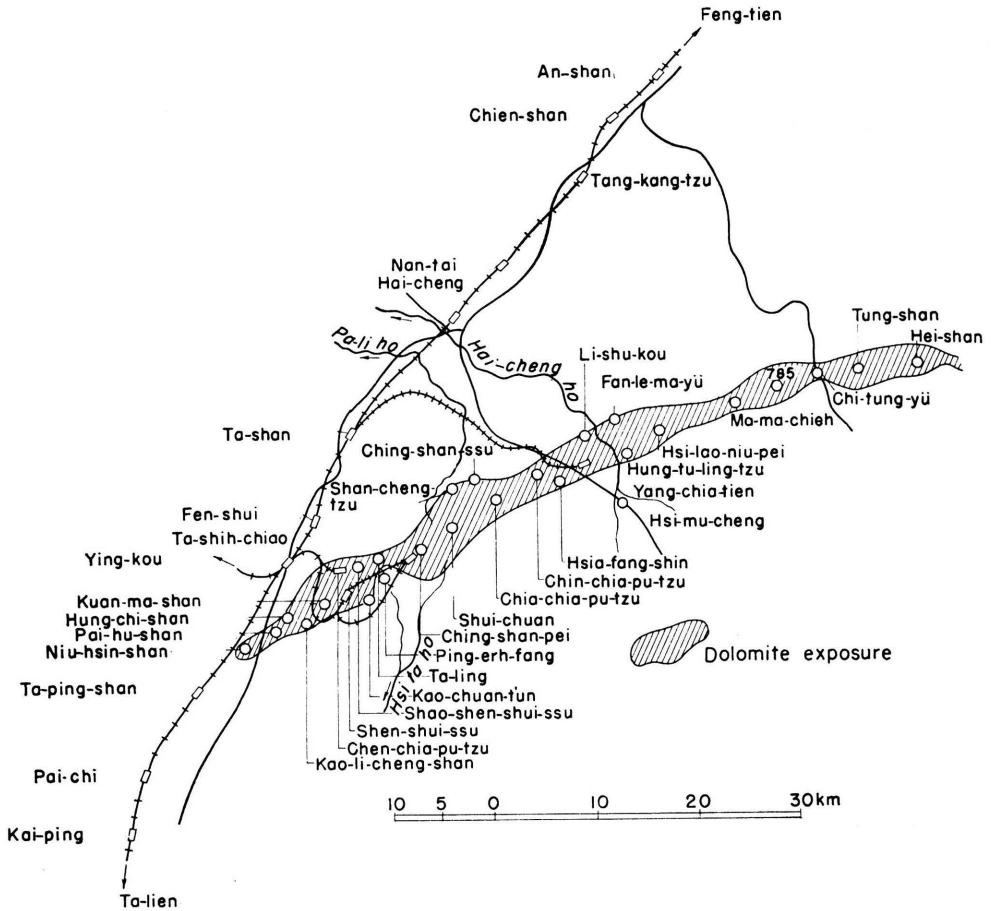


Fig. 1. Dolomite deposits area at Ta-shi-chiao, Hai-cheng district.

light railway, 28 km long, of the Manchuria Talc Industry Co. runs between Ta-shan and Yang-chia-tien. For about 8 km between Sheng-shui-ssu and Ching-shan-pai a cablecar is operated to carry ore. Hai-cheng and Hsi-mu-cheng are connected by the national highway which branches into a truck road leading to Chin-chia-pu-tzu. A truck road runs also between Fen-shui and Ta-lien, and between An-shan and Chi-tung-yü. Thus, transportation to various dolomite mines is relatively convenient.

### III. Geology and Dolomite Deposits

#### A. GEOLOGY

The geology of the area reported on consists of metamorphic rocks and sedimentary rocks belonging to the Archean Liaoho system named by SARTO in 1943. They are roughly divided into three parts as follows:

- Upper part (Kaiping series)
- Middle part (Tashihchiao series)
- Lower part

The upper and lower parts are composed mainly of phyllite which is locally accompanied by injection gneiss, mica schist and talc schist. The middle part is a thick formation of dolomite often containing *Collenia*. The formation strikes N60–90°E and dips 30–50°S.

The Liaoho system is unconformably overlain by quartzite which belongs to the Proterozoic Sinian system and is exposed in places. Quarternary sediments consisting of loess, sand and gravel are distributed along the rivers and the foot of the mountains.

Granites are predominant among igneous rocks. Small exposures of lamprophyre dikes and quartz veins are found locally. The granites are gray, grayish white or pink, mostly gneissose with remarkable crystals of microcline, and occasionally dioritic. Most of the granites are considered to belong to the so-called Kung-chang-ling granite, which is broadly developed in South Manchuria. It is assigned to Late Archeozoic in age, because, where the granites intrude into the Liaoho system injection gneiss has been formed and the granites are unconformably covered by the Sinian quartzite, and also because of lithologic similarity.

The lamprophyre dikes are generally 1 m or so in width, dark green (grayish brown when weathered), fine-grained and compact. They intrude the Liaoho system in places but the age of intrusion is not known.

## B. DOLOMITE DEPOSITS

### (1) Mode of occurrence

The Tashihchiao series constituting the middle Liaoho system is composed almost entirely of dolomite. Though it is locally disturbed the dolomite formation strikes N75°E, dips 40°S, extending about 70 km with an average thickness about 600 m. The basal part of the formation is intercalated with thin beds of phyllite and sericite-chlorite schist, and the middle part contains thin talc schist and magnesite. Vortical fossils(?) apparently *Collenia* (30 cm in maximum diameter) are observed in some parts of the formation.

### (2) Ore grade and reserves

The dolomite is white or grayish white and fine-grained. Its glassy lustre is weaker than that of magnesite.

Analytical data of the dolomite of the report area are few. Generally speaking, however, bedded dolomite is rather uniform in composition, having MgO 18–20% and  $\text{Fe}_2\text{O}_3 + \text{Al}_2\text{O}_3$  around 1%. Contents of lime and silica vary from place to place. Where the silica content exceeds 3% the grade of dolomite is low. In non-bedded dolomite adjoining magnesite deposits MgO increases with decreasing  $\text{SiO}_2$ , and some parts have a reddish brown or reddish purple tint due to the presence of a small amount of iron oxide but the ore grade is high.

The ore reserves are estimated at 24.4 billion tons, calculated by assuming that

the extension of the deposits is 70,000 m, thickness 600 m, depth from the surface 200 m and specific gravity 2.9. Thus, the reserves are almost unlimited. However, if the high-grade parts are mined selectively, the workable reserves would become much smaller.

### (3) Mining

Dolomite is a good refractory material, but the dolomite of the report area has been mined very little, because more valuable magnesite deposits occur in the neighborhood. Only the reddish purple dolomite associated with the Sheng-shui-ssu magnesite deposits was mined by the South Manchuria Mining Co. for a short period. In other places the dolomite was used by the nearby dwellers as building material. Starting in 1943, when the branch railway was laid between Ta-shih-chiao and Sheng-shui-ssu, the dolomite deposits in the northeastern hill of the village of Chen-chia-pu-tzu (about 5 km east-southeast of Ta-shih-chiao station) were worked by the Manchuria Iron Manufacturing Co. and produced about 150 tons per month. The dolomite of Chen-chia-pu-tzu comprises two types, one is grayish white fine-grained dolomite to be used as a flux in steel furnace, and the other is reddish brown or reddish purple coarse-grained dolomite to be used as a refractory material for steel furnace.

## IV. Conclusion

The dolomite deposits of the Ta-shih-chiao and Hai-cheng districts, occurring in the Tashihchiao series, middle part of the Liaoho system, are primary sediments of the Archean Era. The deposits, striking N70°E and extending 70 km with a thickness about 600 m, are large in scale and conveniently located.

The ore grade is low for the most part. Future development of the dolomite mining is questionable, because deposits of magnesite, which is a much better refractory material than dolomite, are found in the neighborhood and are easily mined.

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