Age of Pegmatites Containing Rare Element Minerals in South Manchuria

By

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Pegmatites containing rare element minerals (chiefly niobium-tantalum minerals) occur in two separate areas in south Manchuria, namely in Hai-chêng,¹⁾²⁾ and Sui-chung³⁾ districts⁴⁾ (see Fig. 1 of the paper on Sui-chung pegmatites). The pegmatites of the two districts show almost the same mineralogy and mode of differentiation. Moreover, all of them are elongated in a direction from NE to SE, namely parallel to the so-called Sinian trend of south Manchuria and north China.

There is also a marked petrographical similarity between the granites of the two districts from which the pegmatites were differentiated. The main masses are leucocratic biotite-granites rich in pink potash-feldspar, usually microcline, with local modifications of more basic types to be noted below. Field evidences indicate further that the granites are of the same general age. The data are as follows:

In Hai-chêng district, the granite is intrusive into Liao-ho⁵⁾ system consisting of staurolite-mica-schist, limestone, dolomite, and amphibolite, which, according to Rinzi Saitô, is Archaeozoic in age.⁶⁾ At the junction between the granite and the amphibolite, a beautifully banded injection gneiss is developed. Sodification of the amphibolite and calcification of the granite is seen at the contact. Hastingsite-bearing oligoclase-amphibolite has been produced from andesine-amphibolite on the one hand and hastingsite-quartz-diorite from albite-microcline-granite on the other.

A quite similar granite occurs in An-shan⁷⁾ iron district lying adjacent to the north of Hai-chêng district. R. Saito, who made a detailed stratigraphical study of the district, found that the granite is intrusive into An-shan series (younger Archaeozoic or older Proterozoic) and is covered by quartzite of Hsi-ho⁸⁾ series

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1) 海 城

2) H. Kuno: Proc. Imp. Acad., Vol. 22, 1946 p. 305.

3) 綏 中

4) H. Kuno: the preceding paper.

5) 遼 河

6) R. Saito: Bull. Geol. Inst., Hsin-king, Vol. 93, 1938, p. 10.

7) 鞍 山 8) 細 河

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belonging to Sinian system (younger Proterozoic).¹⁾ He correlated the granite with Kung-changling²⁾ granite typically exposed at Kuno-chang-ling iron mine about 50km east of An-shan.

In Sui-chung district, the granite invades a complex of amphibolite and mica-schist. Here and there the granite is contaminated by the schistose rocks, producing melanocratic gneisses. There is also another complex which is intruded and thermally metamorphosed by the granite. It consists of metamorphosed sandstone and grit, quartzite, and mica-schist. These rocks form a mass which is elongated in a direction from NE to SW and is completely enclosed by the granite.³⁾ Apparently there is no sign of contamination of the granite by the sediments. From the lithologic characters it is possible, if not probable, to correlate with the Liao-ho system already referred to, and the latter complex with the Chi-tung⁴⁾ group of north China. According to Tôru Tomita, the Chi-tung group comprises shale, sandstone, schistose grit, mica-schist, and banded iron ore.⁵⁾ He correlates it with the An-shan series of south Manchuria.

The granite near Sui-chung is traceable as far as Pachia-tzû⁶⁾ manganese mine lying 30km NW of Sui-chung, where it is overlain unconformably by limestone and quartzite of the Sinian system. Thus the granites of Sui-chung and Hai-chêng districts are younger than the An-shan series and Chi-tung group and older than the Sinian system. The age of the intrusion is therefore older or middle Proterozoic.

The stratigraphic successions of pre-Cambrian rocks in south Manchuria and north China are shown in the table below, in which a tentative correlation is made by the writer. The T'ai-shan⁷⁾ granitic rocks of north China may be correlated with the Sui-chung and Hai-chêng granites (or the Kunk-chang-ling granite) of Manchuria in view of the richness in microcline. In this connexion it is worthy of special note that Tomita reported an occurrence of a group of microcline-plagioclase-pegmatites in the vicinity of Lu-lung⁸⁾ about 140km SW of Sui-chung.⁹⁾ The pegmatites occur in a granitic rock quite similar to the Tai-

1) R. Saitô: op. cit., p. 7.

2) 弓長嶺

3) The locality is situated at about 5km N of the small town of Chien-ton-wei (前屯衛) lying midway between Sui-chung and Shan-hai-kuan.

4) 冀東

5) T. Tomita: Jour. Geogr., Vol. 54, 1942, p. 418.

6) 八家子

7) 泰山 8) 廬龍

9) T. Tomita: op. cit., p. 410.

shan granite and are generally elongated from NE to SW, namely parallel to the strike of the Sui-chung pegmatites.

Stratigraphic successions of pre-Cambrian rocks in north
China and south Manchuria.

	North China (after T. Tomita) ¹⁾	Sui-chung district (after H. Kuno)	An-shan and Hai-chêng district (after R. Saitô)
Younger Proterozoic	Diabase, etc. Sinian system	Sinian system	Hsi-ho series
Middle to older	T'ao-k'ê ²⁾ acidic rocks (poor in K-feldspar)		
	T'ao-k'ê basic rocks		
Proterozoic	Ting-jang ³⁾ group		
or	T'ai-shan granitic rocks (rich in microcline)	Sui-chung granite (rich in K-feldspar)	Kung-chang-ling granite (rich in microcline)
younger	T'ai-shan basic rocks		
Archaeozoic	Chi-tung { shale sandstone schistose grit mica-schist banded iron ore	{ metamorphosed sandstone schistose grit mica-schist quartzite	An-shan { phyllite schistose grit quartzite banded iron ore
	Older gneiss complex (quartz-dioritic)		Tuei-mien-shan ⁴⁾ granite (poor in K-feldspar)
Archaeozoic		{ mica-schist amphibolite	Liao-ho { mica-schist dolomite limestone amphibolite

1) T. Tomita: op. cit., p. 418,

2) 桃 科

3) 定 襄

4) 對面山

The age of the granites as determined by the field relations agrees well with the age calculation from the contents of radio-active elements contained in euxenite and fergusonite in Hai-chêng pegmatites. Thus Jun Yoshimura and Kitinosuke Henmi from their own analyses, calculated the age of these minerals as 8×10^8 years, which corresponds to younger pre-Cambrian.¹⁰⁾

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10) J. Yoshimura and K. Henmi: a paper read before the annual meeting of the Institute of Physical and Chemical Research, Manchoukuo in 1945.