

Studies on the Sinian System¹⁾

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1. *Unconformity in the Sinian.* In 1935 I²⁾ reported that in the Kôshû District, Kôkai-dô of Korea, Shidôgû Series, the middle part of Shôgen (Syôgen) System—Korean equivalent of Sinian—is overlain clinounconformably by Kuken Series, the upper part of the system. Later in 1941 an unconformity was found by R. SAITO³⁾ in the Kuantung Series, the middle part of the Sinian, in the Chinchou-Choushuitzu district, Kuantung Province, South Manchuria, and the upper part of the Kuantung Series was assigned by SAITO to Nanshan Series^{4) 5)}. Since SAITO is right, the boundary between Kuken and Shidôgû should be revised as shown in Table 1, while the correlation⁶⁾ between Shôgen System of Korea and Sinian of the Kuantung province is unchanged.

Table 1

Central Area of Kôkai-dô				Kuantung Province	
Old Classification	New Classification	Kôshû District	Shariin-Kaishû		
Kuken Series	Kuken Series	Umpôri Slate Hirôdô Phyllite Kyûzan Sl. & Qtt.	Kyûzan Sl. & Qtt.	Former Nanshan Ser.	Nanshan Series
Shidôgû Series			Gyokkenri Sil. Sl. Sekkazan Sl.	Machiatun St. Shihsanlitai & Top of Yingchêngtzu	
	Shidôgû Series	Tokuzai Dolomite Seisekitô Ls. Ginseki Limestone	Tokuzai Dolomite Seisekitô Ls. Ginseki Limestone	Yingchêngtzu Onoda Stage Kanchingtzu Nankuanling	Kuanlung Series

1) GRABAU, A. W., *Bull. Geol. Soc. China*, I, 1922.

2) MATSUSHITA, S., *Jour. Geol. Soc. Japan*, Vol. 42, 1935.

3) SAITO, R., *Jour. Geol. Soc. Japan*, Vol. 49, 1942.

4) MATSUSHITA, S., (1) *Mem. Ryojun Coll. Engin.*, Inouye Commem. Vol., 1934 &

(2) *Ibidem*, VIII, 2, 1935.

5) MATSUSHITA, S., *Jap. Jour. Geol. Geogr.*, XVIII, 1-2, 1941.

2. *Relation to Granites.* In 1943 SAITO⁶⁾ published his opinion that the Tahoshangshan-Kuantung Series should be excluded from the Sinian, while the larger part of the Shôgen remains in the Sinian, because the Tahoshangshan is intruded by gneissose granite, though the Shôgen rests unconformably on the gneissose granite. But I am confident of my correlation between Shôgen and Sinian. And the so-called unconformable relation of the Shôgen to the underlying gneissose granite in Korea is doubtful, as the exact evidence of the unconformity is nowhere known. On the contrary, in the Chôen district of the western part of Kôkai-dô, I observed in 1941 and 1943 an intrusive contact between the Chôkken Series and the underlying gneissose granite. This is a noticeable fact fully corresponding to the circumstances in the Kuantung province stated above. The Shôgen of Kôkai-dô, therefore, can be rightly correlated to the Sinian of the Kuantung province.

3. *Stratigraphic Position of the Huto System.* The name of the Huto was given by B. WILLIS and E. BLACKWELDER⁷⁾ in 1907 to a group of Pre-Cambrian which is younger than Wutai System and developed along Huto-ho River in the neighbourhood of Wutaihsien, Shansi Province, China. And When GRABAU⁸⁾ redefined the Sinian System in 1922, he treated the Huto as a typical Sinian. Doubting this view, however, S. YAMANE⁹⁾ has been of opinion for the last nearly twenty years, on the basis of his observations in Shansi, Hopei, and Honan, that the Huto is older than Sinian and must be treated separately from the latter. But the true stratigraphic position of the Huto has scarcely been ascertained in the type area of the system. In 1942 I had a fortunate opportunity to visit the type area and recognized with K. MATSUDA the unconformable relation of the Huto to the Wutai at one spot, and S. IWAO⁹⁾ confirmed it at another point. We also noticed Cambrian resting on the Huto with a marked unconformity which was already stated by WILLIS and BLACKWELDER⁷⁾. In the Huto I saw rocks with a close resemblance to those of the lower part of the Sinian of the Hulutao district¹⁰⁾, Southwestern Manchuria.

The conclusions reached by me are as follows :

(a) the Huto System is younger than the Wutai ;

6) SAITO, R., *Mem. Geol. Surv. Manchoukuo*, No. 18, 1943.

7) WILLIS, B. and BLACKWELDER, E., *Research in China*, I, 1, 1907.

8) YAMANE, S., *Jap. Journ. Geol. Geogr.*, VIII, 3, 1929.

9) IWAO, S., *Jour. Geogr. (Tokyo)*, LV, 1943.

10) MATSUSHITA, S., *Bull. Geol. Inst. Manchoukuo*, No. 105, 1942.

(b) the redefinition of the Sinian which GRABAU¹¹⁾ gave in 1922 that it is overlain with a slight clinounconformity or disconformity by the Cambrian can not be applied to the Huto;

(c) the Huto must be overlain clinounconformably by the Hoshan Sandstone, which is considered by YAMANE as a typical Sinian, and its corresponding formations;

(d) accordingly the Huto should be treated separately from the typical Sinian, just as YAMANE discussed twenty years ago. But I propose to leave the name of the Sinian in the broader sense as well involving the Huto.

Thus the Sinian System should be divided into two parts:—Upper or the Sinian s. str. and the Lower or the Huto System, the relation between them being unconformable.

4. Tentative Correlation of the Sinian Formations of Eastern Asia.

C. S. KAO, Y. H. HSIUNG, and P. KAO¹¹⁾ established in 1934 a correlation of the Sinian of North China, and classified the system into the Upper Sinian or Chingpeikou Group, the Middle Sinian or Chihsien Group, and the Lower or Nankou Group. It is apparent that my Sinian s. str. coincides with Chingpeikou Group, and that the Huto corresponds to Chihsien and Nankou Groups. The tentative correlation of the Sinian in broader sense is shown in Table 2. The name of Lushan System in the table has been given by T. KOBAYASHI¹²⁾ to T. Y. YÜ's¹³⁾ Lower Sinian in the Yangtze Valley. It is interesting to note that in the Kuken Series of Korea, which corresponds to YÜ's Upper and Middle Sinian including famous Nantou Tillite, there occurs a peculiar bed called Hirôdô Conglomeratic Phyllite¹⁴⁾ which may be suspected as a floating ice deposit.

5. *Age of Granite Intrusion.* I have some doubts in the correlation of granite by means of ordinary petrographic characters, and consider that the exact contemporaneity of granites must be made clear by the comparison of absolute age based on radioactive minerals. But since such a method is at present impracticable, and the results of T. TOMITA's¹⁵⁾ petrologic and geologic investigations on the Pre-Cambrian metamorphic complex of North China is very interesting, I have tried to apply TOMITA's results to the classification of Pre-Cambrian granites

11) KAO, C. S., HSIUNG, Y. H., and KAO, P., *Bull. Geol. Soc. China*, XIII, 2, 1934.

12) KOBAYASHI, T., *Bull. Resources Science Institute*, 2, 1943.

13) YÜ, T. Y., *Bull. Geol. Soc. China*, XVI, Ting Memorial Volume, 1936-7.

14) MATSUSHITA, S., *Sc. Rep., Geol.-Miner. Inst. Kyoto Imp. Univ.*, 2, 1943.

15) TOMITA, T., *Jour. Geogr. (Tokyo)*, LIV, 1942 & LV, 1943.

of Manchuria and Korea as shown in Table 2. The Kokulian Granite is the unified name for the Pre-Cambrian granites of Manchuria and Korea corresponding to TOMITA's Taishan Granite, whereas the Kungchangling Granite is the one for the Post-Tahoshangshan or Post-Chokken and Pre-Nanshan or Pre-Kuken Granites and may correspond to TOMITA's Taokê Granite.

Table 2

Standard	Central China	North China			Manchuria	Korea
Cambrian	Cambrian	Cambrian			Cambrian	Cambrian
Sinian s. str.	Tōngying Limestone	Hoshan Sandstone	Chingpeikou Group	Siliceous Limestone	Wuhsingshan Series	Kuken Series
	Toushantou Series		Quartzite	Hsiho Series	Nanshan Ser.	
Taokê Granite	Lushan System	Taokê Granite			Kungchangling Granite (Seikoshin Gn.)	
Huto System		Huto System	Chihhsien Group	Nankou Limest.	Kuantung Series	Shidōgū Series
			Nankou Group		Tahoshangshan Series	Chokken Series
Tingsing System		Wutai System in part (Tingsing Group)				
Taishan Granite		Taishan Granite			Kokulian Granite (Kankō Gneiss)	
Wutai System		Wutai System in part (Chitung Group)			Liaoho System	Matenrei System
Oldest Gneissose Rock		Oldest Gneissose Rock (quartz diorite)			Liaotung System	

Note. Broken lines indicate unconformities.