
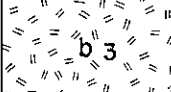
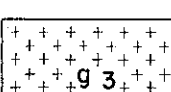
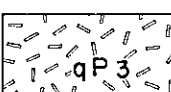
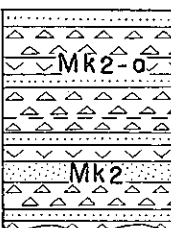
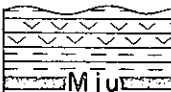
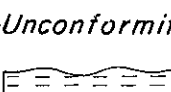
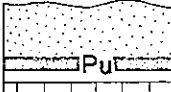
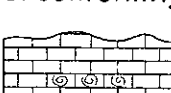

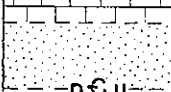

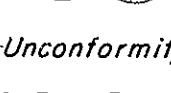

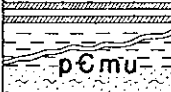
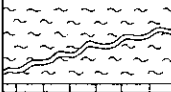

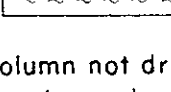



GEOLOGIC COLUMN AND UNIT DESCRIPTIONS : MANCHURIAN SEQUENCE ONLY

AGE	ROCK UNIT	LITHOLOGY: THICKNESS WHERE KNOWN	REMARKS
QUATERNARY	Recent alluvium	 Sand, gravel, and clay	
	Pleistocene basalt	 Olivine basalt	Olivine basalt, west of Chang-pai Shan (長白山), covers the plateaus and mesas which range in altitude between 800 m and 1,400 m.
MESOZOIC	Upper Cretaceous	 Porphyritic granite	Porphyritic granite, probably of Cretaceous age, crops out northwest of Ta-li-tzu-kou (大梨子溝) iron mine and east of Chi-tao-kou (七道溝) iron mine. Intrusion of the porphyritic granite has a genetic relation to magnetite at Shih-tang-kou (石塘溝); Tang-shih-kou-tzu (唐石溝) and lead and silver ores at Yin-tzu-kou (銀子溝).
		 Quartz porphyry	Quartz porphyry in white to light brown lava flows which are partly brecciated. In Korea, quartz porphyry and porphyrite are widely distributed south of Lin-chiang (臨江) and are in an intricate association with one another.
	 <i>Mk2-a, andesitic and trachytic agglomerate and tuff breccia. Mk2, tuffaceous sandstone and tuffaceous shale. Total thickness probably 1500 m</i>	Both Mk <sub>2</sub> and Mk <sub>2-a</sub> are distributed along the bank of the Yalu River in the western area of this sheet. Mk <sub>2-a</sub> , composed of andesitic and trachytic agglomerate and tuff breccia, apparently grades into more acidic Bukkokujil (北谷谷里) series of Korea which is represented by quartz porphyry. Mk <sub>2</sub> is composed of tuffaceous sandstone and tuffaceous shale, with occasional thin beds of volcanic rocks.	
	Unconformity		
	Upper Jurassic	 Conglomerate; sandstone; shale; coal; and tuff. Probable thickness 1000 m	Upper Jurassic coal-bearing formation, typical outcrop at Shih-jen-kou (石人溝), is composed of red conglomerate, tuffaceous sandstone, bluish marly shale, red tuffaceous shale, sandstone, shale, coal, and green and red tuff.
	Lower Jurassic	 Sandstone; shale; and coal. Approximate thickness 300 m	Lower Jurassic coal-bearing formation, composed of sandstone and shale, crops out along the valley north of the village of Yen-tung-kou (延東溝).
PALEOZOIC	Unconformity		
	Upper Paleozoic (Taitzuho System)	 Sandstone; shale; limestone; coal. Approximate thickness 500 m	Paleozoic coal-bearing formation, belonging to the Taitzuho (太子河) system, is composed of sandstone, shale, and limestone. Sporadic outcrops occur along the Hun Chiang (濛河).
	Lower Paleozoic	 Limestone and shale. Thickness varies between 600 m and 1300 m	Limestone with various lithologic characteristics, such as Cryptozoön limestone, oolitic limestone, and vermicular limestone, are associated with brown sandy shale; all intensely folded and thrust-faulted.
PRECAMBRIAN	Unconformity		
	Upper Precambrian (Sinian System)	 Limestone. Approximate thickness 3000 m	Cryptozoön-bearing, compact limestone mapped in the northwestern part of the sheet, along the highway between Lin-chiang and San-tao-kou (三套溝).
	Unconformity		
		 Slate and quartzite. Approximate thickness 200 m	Slate and quartzite, large ripple marks in the quartzite.
	Unconformity		
 Shale and marl. Approximate thickness 2000 m		Nanfen (南芬) shale, of various colors predominantly reddish purple and bluish green. Grayish-green marl occurs near the base.	
Unconformity			
	 Quartzite. Approximate thickness 500 m	Tiaoyutai (炒玉台) quartzite, white to light brown; hematite, chamoisite, and manganese occur near the base.	
PRECAMBRIAN	Unconformity		
	Pre-Sinian	 Granite gneiss	Pre-Sinian granite gneiss includes all granite gneisses and injection gneiss which occur within the area of this sheet. The so-called Lungkang (龍崗) gneiss is a hornblende granite gneiss, exposed along the ridge of the Lung-kang Range. By intrusion into the Liaoh system, the Lungkang gneiss formed extensive injection gneiss.
	INTRUSIVE CONTACT		
	Middle Precambrian (Liaoh System)	 Limestone and phyllite. Approximate thickness 4000 m	The upper part of the Middle Precambrian (pCm) Liaoh system within this sheet area is composed of black limestone, graphite-sericite phyllite, chlorite phyllite, sericite phyllite, mica schist, quartzite with sericite schist, and limestone; of which chlorite phyllite and graphite phyllite are predominant. Contains iron ores, mostly hematite in bedded veins of epigenetic origin, but some mixed with dolomite and partly self-fluxing. This part of the formation can be correlated partly with the Kaiping (開平) series at Ta-shih-chiao (大石橋) and partly with the Anshan (鞍山) series at An-shan and other places.
 Schist; quartzite; and limestone. Approximate thickness 3000 m			
Middle Precambrian (Liaoh System)	 Slate; schist; limestone. Approximate thickness 6500 m	The middle part of the Liaoh system within the sheet is composed of phyllitic slate, sericite-chlorite schist with staurolite, and limestone; thickness variable; best developed in the vicinity of Lin-chiang.	
	 Dolomite and limestone. Approximate thickness 2500 m		
		 Biotite schist. Approximate thickness 1000 m	The lower part is crystalline dolomite and crystalline limestone, about 2,500 m thick, and biotite schist, about 1,000 m thick. The dolomite and limestone can be correlated with the Tashihchiao series in Ta-shih-chiao district where thick magnesite deposits occur.
		(Column not drawn to scale)	

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