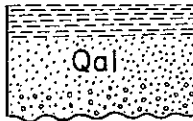
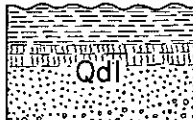
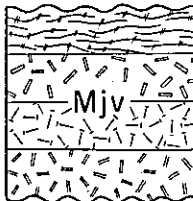
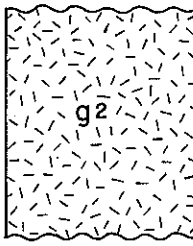
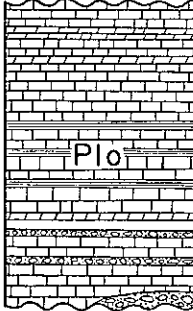
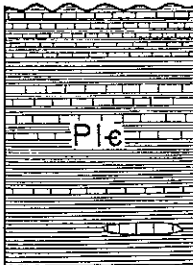
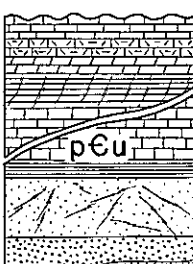
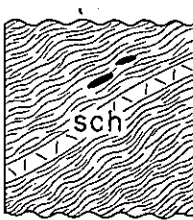



## GEOLOGIC COLUMN AND UNIT DESCRIPTIONS

AGE	ROCK UNIT	LITHOLOGY; THICKNESS WHERE KNOWN	UNIT DESCRIPTION	ECONOMIC VALUE	REFERENCES
QUATERNARY	Alluvium	 Sand, clay, and gravel; thickness less than 20 meters	Alluvium, consisting of sand, clay, and gravel, covers flood plains and low terrace remnants along the T'ang Ho (湯河), the Yang Ho (洋河), the Mo Ho (慕河), the Luan Ho (濼河) and their tributaries.		
	Diluvium	 Loess, redeposited loess, sand, clay and gravel; thickness less than 40 m	Diluvium, consisting of aeolian loess, redeposited loess, sand, clay and gravel, covers the western terrace remnants and fills the valleys south and west of Sung-chia-fen (宋家坟).		
MESOZOIC	Jurassic volcanic complex	 Andesite porphyry, diorite porphyry, syenite porphyry and andesite	The Jurassic volcanic complex in the hills north of Ch'ang-li (昌黎) consists of andesite porphyry, diorite porphyry, syenite porphyry and andesite. It also occurs near An-shan-chen (安山嶺).		
	Pre-Jurassic granite	 Biotite granite, biotite-hornblende granite, quartz syenite, quartz monzonite, and felsitic granite	Pre-Jurassic granite near P'ing-shih-chuang (平市庄) consists of biotite granite, biotite-hornblende granite, quartz syenite, quartz monzonite, and felsitic granite.		
	Ordovician formation	 Limestone, dolomite, shale, and conglomerate; thickness 700 m	The Ordovician formation is sporadically exposed along the valley between Luan-hsien (涿縣) and Lei-chuang (雷莊). The formation is divided into Middle Ordovician and Lower Ordovician. The former, generally called the Machiakou limestone, consists of massive limestone and dolomite, and is less than 300 m thick. The latter is subdivided into upper and lower parts. The upper part, called the Coralline limestone (200 m thick), consists of shale, limestone and coralline massive limestone. The lower part, called the Yehli (冶里) limestone (200 m thick), consists of massive dolomitic limestone with intraformational conglomerate and is locally accompanied by conglomerate (less than 1 m thick).		
PALEOZOIC	Cambrian formation	 Limestone and shale; thickness 300 m	The Cambrian formation comprises three parts as follows: The Upper Cambrian, or Fengshan (鳳山) series, is 50 m thick and consists of thinly bedded platy and marly limestone and shale; the Middle Cambrian, or Changshan series, 100 m thick, consists of green shale and gray oolitic limestone; the Lower Cambrian, or Mantou series, consists of purple shale interbedded with thin limestone, and is 150 m thick.		
	Upper Precambrian formation (Sinian system)	 Limestone, dolomite, phyllite, chert, shale, quartzite, sandstone, and conglomerate; thickness 2,500 m	The Upper Precambrian formation, or Sinian system, is sporadically exposed in the western part of the map area. It is generally divided into two parts. The upper part, 2,000 m thick, consists of limestone, siliceous limestone, dolomite, phyllite, chert, and red shale at the base. The lower part, 500 m thick, consists of thickly bedded quartzite, siliceous sandstone, and local basal conglomerate. No remarkable unconformity is observed between the two parts.		
PRECAMBRIAN	Crystalline schist (Wutai system)	 Mica schist and hornblende schist with iron ore	Crystalline schist, or the Wutai system, is sporadically exposed in the western part of the map area. It consists of mica schist and hornblende schist accompanied by banded siliceous iron ore. It is Middle Precambrian in age.		
	Granite gneiss (Taishan complex)	 Gneissose granite, gneissose diorite, injection gneiss, lamprophyre, pegmatite, and crystalline schist	The gneiss complex, or Taishan complex, is believed to constitute the basement of North China. It consists of various kinds of gneissose granite, gneissose diorite, injection gneiss, lamprophyre, and pegmatite, accompanied by crystalline schists.		

(Column not drawn to scale)

**Gold**  
Placer gold occurs in the Recent deposits 2 km and 6 km south of Lu-lung (盧龍). The gold-bearing gravel beds were formerly worked by the natives with primitive methods, but the gold is low grade.

**Limestone**  
The Ordovician limestone in the vicinity of Luan-hsien and Lei-chuang is superior in quality and is quarried for lime manufacture. Limestone at Wu-shan, 2 km northeast of Luan-hsien station contains 3.57% SiO<sub>2</sub>, 0.71% Fe<sub>2</sub>O<sub>3</sub>, Al<sub>2</sub>O<sub>3</sub>, 52.39% CaO, and 0.67% MgO. It may be useful for iron smelting and cement industry. Limestone near Lei-chuang station contains 3.77% SiO<sub>2</sub>, 1.65% Fe<sub>2</sub>O<sub>3</sub>, Al<sub>2</sub>O<sub>3</sub>, 48.49% CaO, and 0.47% MgO. It may be useful for cement industry but not for iron smelting owing to deficient reserves.

**Iron**  
Anshan-type banded siliceous ore containing hematite and magnetite occurs in the Wutai system near Luan-hsien. The ore contains 25 to 47% Fe and 33 to 62% SiO<sub>2</sub>, and may be used for iron manufacture if a concentration process for low-grade ore is used.

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