
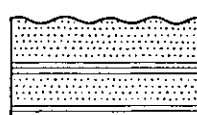

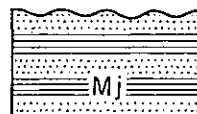
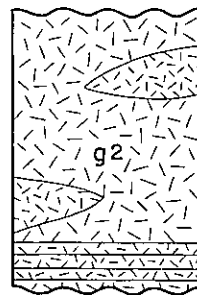
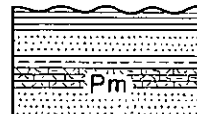
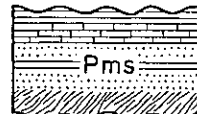
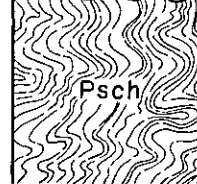


GEOLOGIC COLUMN AND UNIT DESCRIPTIONS

AGE	ROCK UNIT	LITHOLOGY; THICKNESS WHERE KNOWN	UNIT DESCRIPTION	ECONOMIC VALUE	REFERENCES
QUATERNARY	Alluvium	 Sand, clay and gravel; thickness less than 10 meters	Alluvium, consisting of sand, clay and gravel, is distributed in the drainage basins of the Amur River, the Nen Chiang (嫩江), and the Zeya River. The Amur River between Hu-t'ung-chen (湖通鎮) and Ch'ing-shih-ch'ang (青石廠) forms a narrow meandering gorge.	<p>Gold</p> <p>Placer gold is found in the Recent deposits along the Hu-ma Ho [呼瑪河], the Ch'o-na Ho, the Ku-lung-kan Ho [古龍幹河], the Hu-t'ung Ho, the Han-ta Ho, and the K'uan Ho [寬河] these streams run through the regions of the pre-Jurassic formation and the Paleozoic crystalline schist, which are locally intruded by many small poor gold-bearing quartz veins of Cretaceous age that are considered the source of the placer gold. Some of the gold mines are as follows:</p> <p>(1) Yu-ching-kou Gold Mine is 28 km west of Hu-ma. A gold-bearing sand and gravel bed is found at the depth of 0.6 to 0.9 m below the river bed, and ranges in thickness from 0.2 to 1 m. The placer gold is generally composed of minute grains with a grade of about 80 percent.</p> <p>(2) Ku-lung-kan Gold Mine is near Erh-ch'ia (二卡) 40 km southwest of Hu-ma. The gold-bearing gravel bed is 0.3 to 1.5 m thick, and gold amounts to 6 to 13 gr per ton on an average.</p> <p>(3) K'uan-ho Gold Mine is situated near Yao-ch'ia-chin-ch'ang (腰卡), 15 km southwest of San-tao-ch'ia (三道卡). The placer gold is found in the Recent deposits between Yao-ch'ia and K'uan-ho-chin-ch'ang (寬河金廠), extending for 15 km along the stream. Gold is generally in minute grains of about 88 percent grade. The bedrock in the vicinity of the gold mine consists of gneissose granite.</p>	<p>Geological Institute, South Manchuria Railway Company, 1933, Report on the mineral resources in Manchuria, no. 1.</p> <p>1938, Map of North Manchurian mineral resources, scale 1:500,000: (Unpub.)</p> <p>NALIVKIN, D. V., editor, 1955, Geological map of U.S.S.R., scale 1:5,000,000: U.S.S.R. Ministry of Geology.</p> <p>Research Section, South Manchuria Railway Company, 1938, Outline of Manchuria economy.</p> <p>SAITŌ, Rinji, compiler, 1940, Geological map of Manchuria and adjacent areas, scale 1:3,000,000: Manchoukai Geol. Inst.</p>
	UNCONFORMITY				
TERTIARY	Neogene formation	 Sandstone, clayey shale, lignitic shale, bentonitic shale and conglomerate; thickness 10 to 100 m	The Neogene formation is widely exposed in the eastern half of the map area, resting on the pre-Jurassic granite (g ₂), the Cretaceous andesite (Mka), and the Silurian formation (Pms). Soviet geologists (NALIVKIN, 1955) defined it as a Pliocene continental deposit. The formation consists of reddish yellow to reddish gray, soft, rough sandstone, dark brown to black clayey shale, lignitic shale, bentonitic shale and conglomerate. Shale beds 0.3 - 1.0 m thick are interbedded in the sandstone at 2 to 3 m intervals. The formation is stratified horizontally.		
	UNCONFORMITY				
MESOZOIC	Cretaceous andesite	 Andesite, basalt, andesite porphyry, diorite porphyry and pyroclastics	Cretaceous andesite occurs as flows and forms low terraces along the Amur River. It consists mainly of andesite in association with basalt, andesite porphyry, diorite porphyry and their pyroclastics. Soviet geologists defined the unit as Upper Cretaceous intermediate and basic effusive rocks.		
	EFFUSIVE CONTACT				
PALEOZOIC	Jurassic formation	 Sandstone, shale and conglomerate; thickness unknown	The Jurassic formation is exposed along the Han-ta Ho [漢達河] and the Ch'o-na Ho [綽納河]. It consists of sandstone, shale and conglomerate, which are locally contact-metamorphosed into graywacke and clay slate owing to the intrusion of Cretaceous quartz veins and the extrusion of the Cretaceous andesite. The formation rests unconformably on the pre-Jurassic granite (g ₂).		
	UNCONFORMITY				
PALEOZOIC	Pre-Jurassic granite	 Biotite-hornblende granite, gneissose granite, pegmatite, aplite, granodiorite, quartz diorite, diorite, granite porphyry and quartz porphyry	Pre-Jurassic granite occurs as a batholith and laccoliths intruding the Paleozoic formations, and is sporadically exposed in the western half of the map area. It is light gray, reddish gray or reddish green, fine- to coarse-grained, subequigranular biotite-hornblende granite, consisting of orthoclase, plagioclase, biotite, hornblende and a small amount of quartz, accompanied by apatite, magnetite, titanite and zircon as accessory minerals. The granite is locally associated with gneissose granite, pegmatite, aplite, granodiorite, quartz diorite, diorite, granite porphyry and quartz porphyry. The rock is locally intruded by many low-grade gold-bearing quartz veins of Cretaceous age, and is overlain by the Jurassic formation, the Cretaceous andesite and the Neogene formation. Soviet geologists define it as Paleozoic granite.		
	INTRUSIVE CONTACT				
	Middle(?) Paleozoic formation	 Crystalline limestone, marl, sandstone, shale and phyllite; thickness unknown	The Middle(?) Paleozoic formation is exposed near Ch'ing-shih-ch'ang along the Amur River. It consists of crystalline limestone, marl, sandstone, shale and phyllite. The rocks are excessively metamorphosed by the intrusion of the pre-Jurassic granite or the extrusion of the Cretaceous andesite. The limestone yields no fossils.		
	RELATION UNKNOWN				
PALEOZOIC	Silurian formation	 Limestone, marl, sandstone, shale and phyllite; thickness unknown	The Silurian formation is exposed on the eastern banks of the Amur River near Kol'tsovo, Kumara and Petro-pavlovka. It consists of limestone, marl, sandstone, shale and phyllite.		
	RELATION UNKNOWN				
PALEOZOIC	Paleozoic(?) crystalline schist	 Crystalline schist, quartzite and slate; thickness unknown	Crystalline schist in association with quartzite and slate is widely exposed along the Hu-t'ung Ho [湖通河]. Whether it is a Precambrian schist or a Paleozoic metamorphosed schist is unknown due to scarce data, but by correlating it with the Silurian formation in the U.S.S.R., it appears to have been derived from the Paleozoic formation, which was exceedingly contact-metamorphosed by the intrusion of the pre-Jurassic granite or the extrusion of the Cretaceous andesite.		
	(Column not drawn to scale)				