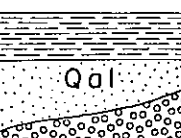
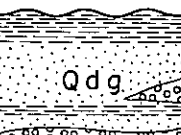
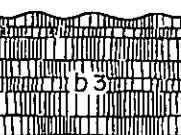

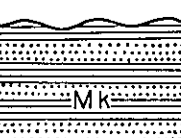
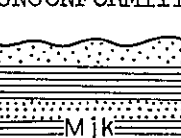



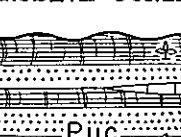
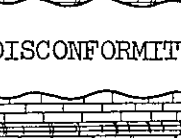




GEOLOGIC COLUMN AND UNIT DESCRIPTION

AGE	ROCK UNIT	LITHOLOGY; THICKNESS WHERE KNOWN	UNIT DESCRIPTION	ECONOMIC VALUE
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 O-mu-erh Ho [额尔齐斯河], and their tributaries.	<p>Gold</p> <p>Placer gold occurs along the Lao Kou [老湖] and the Pei Kou [排湖] in the uppermost reaches of the O-mu-erh Ho. Outline of the Lao-kou mine according to T. UCHINO (1935) follows:</p> <p>(1) Locality and transportation. Lao-kou is situated 28 km SW of Mo-ho, and Pei-kou 25 km SW of Mo-ho. The road between Mo-ho and Lao-kou is passable for wagons.</p> <p>(2) Topography and surface condition. The vicinity of Lao-kou is an undulating hilly land covered by forests. The gold placer is covered by wide swampy land where the ground water level lies at a depth of 0.3 to 1 m. Between August 16 and September 4, 1935, the ground along the Pei Kou was still frozen to the depth of 0.5 to 1 m, although the ground around Lao-kou was not frozen. The workable months are between April and October.</p> <p>(3) Geology. The bedrock consists of the Upper Jurassic clay slate and sandstone, covered by 4 to 5 m thick Recent deposits. The Recent deposits are divided into two parts, the gold placer 0.5 to 1.5 m thick and the 2.5 m thick overburden which consists of surface soil, clay, sand, and gravel. The area of the gold locality, including the formerly exploited sites, is 20 km by 300 m.</p> <p>(4) Reserves. The gold placer worked in 1935 was 0.5 to 1.5 m thick, and contained 0.3875 gr of gold per cubic yard on an average. The grade of the gold grains was 90 percent. The mineral reserves of placer gold are difficult to estimate owing to the vast area and variable quality.</p> <p>(5) Origin of the deposit. Placer gold occurs only in the Recent deposits throughout the map area. It is considered to have been derived from the quartz veins which had intruded during Cretaceous into the Jurassic formation, the Jurassic-Cretaceous formation, the pre-Jurassic granite, and the Precambrian gneiss and schist.</p>
	Diluvium	 Sand, clay and gravel; thickness unknown	Diluvium, consisting of sand, clay and gravel, occurs only in the U.S.S.R. near Pioner.	
	Quaternary basalt	 Olivine basalt, andesite and tuff	Quaternary olivine basalt, associated with andesite and tuff, is exposed along the Bol'shoy Never.	
	Cretaceous volcanic complex	 Diorite porphyry, andesite porphyry, diabase, dolerite, propylite, rhyolite, tuff, sandstone and breccia	The Cretaceous volcanic complex near Mo-ho [莫河] occurs as flows and sheets of dark green igneous intrusives and extrusives, such as diorite porphyry, andesite porphyry, diabase, dolerite, propylite, black rhyolite, tuff, sandstone and breccia.	
MESOZOIC	Cretaceous formation	 Sandstone, shale and conglomerate; thickness unknown	The Cretaceous formation along the Amur River near Mo-ho consists of sandstone, shale and conglomerate.	
	Jurassic-Cretaceous formation	 Sandstone, shale, conglomerate and marl; thickness unknown	The Jurassic-Cretaceous formation, consisting of sandstone, shale, conglomerate and marl, is exposed in the eastern part of the map area. At a locality east of longitude 124° E (refer to Magdagachi sheet, NN 51-9), the beds yielding plant fossils such as <i>Podozamites</i> sp., <i>Equisetites</i> sp., etc., alternate with the beds yielding animal fossils such as <i>Lucina</i> sp., <i>Cyrena</i> sp., etc., identified by A. I. KHALPONIN in 1929 (cited by T. UCHINO, 1935). The formation rests disconformably or conformably on the Jurassic formation (Mj), and is defined (NALIVKIN, 1955) as Upper Jurassic to Lower Cretaceous in age.	
	Jurassic formation	 Clay slate, sandstone and conglomerate; thickness unknown	The Jurassic formation is widely exposed along the Amur River. It consists of clay slate, sandstone, and, locally, conglomerate. The clay slate predominates, is black to dark brown, and has a silky luster. The sandstone, interbedded as lenses in clay slate, is grayish brown to dark brown, medium- to fine-grained, and shows knotty schistosity. It is cemented with sand grains flattened due to pressure. The pebbles of the conglomerate are corroded quartzite less than 5 cm in diameter. The formation is locally intruded by Cretaceous gold-bearing quartz veins by which shale was contact-metamorphosed into clay slate. Soviet geologists divide the formation into two parts, the Upper (Mju) and the Lower to Middle Jurassic (Mjm).	
	Pre-Jurassic granite	 Biotite granite	Pre-Jurassic biotite granite intrudes the Devonian formation (Pnd) and the Precambrian schist, and is overlain by the Mesozoic formation (Mj, Mjk and Mk). Soviet geologists define it as Paleozoic	
	Upper Paleozoic formation	 Sandstone, clay slate and limestone; thickness unknown	The Upper Paleozoic formation includes the Lower Carboniferous formation and the Permo-Carboniferous formation. The Lower Carboniferous formation is a marine deposit, widely exposed along the Ignashikha, the Omutnaya, the Urusha and the Ol'doy Rivers. It consists of sandstone, clay slate and limestone. The limestone yields animal fossils, identified by KASANSKI, OBRUSCHEW and KRISTOFOVICH as follows (KOBAYASHI, 1942): <i>Spirifer striatus</i> Mart., <i>Productus semireticulatus</i> Mart., <i>Springathyris</i> cf. <i>extenuatus</i> Hall, and <i>Reticularia</i> sp. The Permo-Carboniferous formation is a terrestrial deposit, exposed on the east bank of the Urka River, and consists of clay slate that contains plant fossils and sandstone.	
	Undifferentiated Middle Paleozoic formation	 Limestone, clay slate, shale, mudstone and marly shale; thickness unknown	The undifferentiated Middle Paleozoic formation, consisting of limestone, clay slate, shale, mudstone and marly shale, is exposed along the Malyy Never.	
PALEOZOIC	Devonian formation	 Pndu (Upper Devonian formation): limestone; thickness unknown Pndl (Middle to Lower Devonian formation): limestone, mudstone and shale; thickness unknown	The Devonian formation is widely exposed in the northern part of the map area along the Amazar, the Urka, the Omutnaya, the Urusha, the Ol'doy and the Bol'shoy Never Rivers. According to F. RAUPACH (1934), it is divided into the Upper (Pndu) and the Middle to Lower (Pndl) formations. The Upper Devonian formation in the upper reaches of the Omutnaya River consists mainly of limestone that yields <i>Strophomena rhomboidalis</i> Wahl., <i>Atrypa reticularis</i> Linn., <i>Spirifer</i> sp., <i>Pentamerus</i> cf. <i>galeatus</i> Daln., and <i>Streptorhynchus</i> sp. The Middle Devonian formation consists, in descending order, of limestone, mudstone, and reef-like limestone. The limestone in the upper reaches of the Omutnaya River yields <i>Atrypa desquamata</i> Sow. The mudstone along the Shikhan River yields <i>Atrypa aspera</i> . The reef-like limestone in the upper reaches of the Ol'doy River yields <i>Favosites</i> sp. and <i>Actinostroma clathratum</i> Mich. The Lower Devonian formation along the Urusha and the Ol'doy Rivers consists of limestone and shale, and yields crinoids, brachiopods such as <i>Spirifer</i> aff. <i>carinatus</i> Schmur and <i>Rhynchonella</i> cf. <i>procuboides</i> , bryozoa and trilobites.	
	Ordovician-Silurian formation	 Shale and sandstone; thickness unknown	A formation along the upper reaches of the Omutnaya consists of a Silurian marly shale in the upper part and an Ordovician sandstone in the lower part. According to KASANSKI (refer to KOBAYASHI, 1942), the marly shale yields <i>Calymene blumenbacki</i> Brongn., <i>Rhynchonella</i> cf. <i>borealis</i> Salt. and <i>Monticulipora</i> cf. <i>petropolitana</i> Eichw. of Silurian age, and the sandstone yields <i>Orthis calligrama</i> Dalman of Ordovician age.	
	Precambrian schist	 Mica schist	Precambrian schist, consisting chiefly of mica-schist, is exposed in the northwestern part of the map area; available data are few.	

(Column not drawn to scale)

REFERENCES

KOBAYASHI, Teichi, and NOMAKA, Jun'ichi, 1942, On the Mammo Group: Jour. Geography, Tokyo, v. 54, no. 643.

KRISTOFOVICH, A., 1926, Geology: Russian, Pac. Sci. Inv.

NALIVKIN, D. V., editor, 1955, Geological map of U.S.S.R., scale 1:5,000,000: U.S.S.R. Ministry of Geology.

OBRUSCHEW, W. A., 1926, Geologie von Sibirien.

1930, Zur Existenzfrage eines mongolisch-amirischen Falten-gürtels: Centralbl. für Mineralogie, usw, Abt. B.

RAUPACH, F., 1934, Stratigraphische und tektonische Entwicklung des russischen Fernen Ostens, Mandchurie, und zentralen Mongolei.

SAITO, Rinji, compiler, 1940, Geological map of Manchuria and adjacent areas, scale 1:3,000,000: Manchoukuo Geol. Inst.

UCHINO, Toshio, 1935, Placer gold in the vicinity of Mo-ho: Unpub. rept., Geol. Inst., S. Manchuria Ry. Co.

Limestone
Limestone in the Carboniferous and Devonian formations in the U.S.S.R. is useful for lime and cement manufacture.