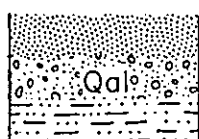


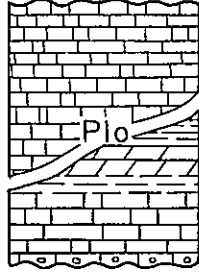
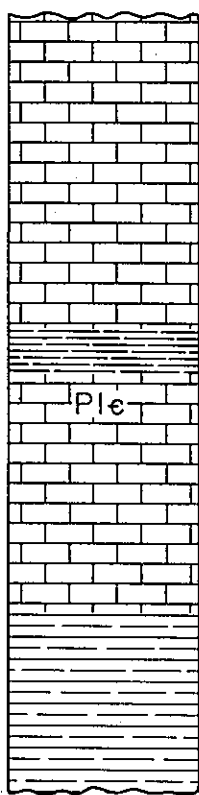



GEOLOGIC COLUMN AND UNIT DESCRIPTIONS

AGE	ROCK UNIT	LITHOLOGY; THICKNESS WHERE KNOWN	UNIT DESCRIPTION	REFERENCES
QUATERNARY	Alluvium	 Sand, gravel and silt; thickness less than 10 meters	Alluvium, consisting of fluvial sand, gravel and silt, is widely distributed in the delta plains of the Huang Ho (Yellow River) and in the plains of the Hu Ho, etc.	GRABAU, A. W., 1923-1924, Stratigraphy of China, pt. 1, Paleozoic and older rocks: China, Geol. Survey, Peking. OBATA, Tadahiro, 1951, Ordovician system of North China, in Geology and mineral resources of the Far East, North China, I-4-d: Comp. Comm. Geology and Mineral Res. Far East, Tokyo Geog. Soc. WILLIS, B., and BLACKWELDER, E., 1907, Research in China, v. I.
	Diluvium	 Loess, sand and gravel; thickness less than 30 m	Diluvium consists chiefly of primary loess of aeolian and fluvioc-aeolian origin, accompanied by sand and gravel. Lenses of calcareous conglomerate are found near the base. Diluvium is occasionally underlain by a red clay of Pliocene age. Diluvium in the Huan Ho delta of the northern map area an unconsolidated deposit several hundred meters thick, which was derived from loess and desert sand of the interior during Pleistocene age.	
MESOZOIC	UNCONFORMITY			
	Diorite	 Gabbroic diorite	Diorite north of Chi-nan is a gabbroic diorite intruding the Ordovician limestone. It may be Cretaceous in age.	
INTRUSIVE CONTACT				
PALEOZOIC	Ordovician formation (Chinan limestone)	 Limestone, dolomite and shale; thickness 850 m	The Ordovician formation in the district of Chi-nan was primarily studied by WILLIS and BLACKWELDER (1907) who named the formation the "Chinan limestone" and estimated its thickness at 850 m. The Chinan limestone is divided into two parts, the lower part consisting of a variable sequence of light-colored argillaceous limestone or dolomite and thin shale without fossils, and the upper part consisting of massive strata of bluish dolomitic limestone of fine texture. According to OBATA (1951) the Chinan limestone includes the Lower and Middle Ordovician Formations (refer to Chinan East, NJ 50-15).	
	DISCONFORMITY?			
PALEOZOIC	Cambrian formation	 Limestone and shale; thickness 450 m	The Cambrian formation in the district of Ch'ang-hsia (張夏), about 25 km south-southwest of Chi-nan, was primarily studied by WILLIS and BLACKWELDER (1907). Later, GRABAU (1923-24) modified it. (See Correlation Chart, sheet NJ 50-15.) The formation consists in descending sequence of 4) the Ch'anghsia limestone, 180 m thick, 3) the Kushan (廬山) shale, 15 m thick, 2) the Changhsia limestone, 150 m thick, and 1) the Mant'ou (段頭) shale, 150 m thick. According to GRABAU the units of the formation are as follows: The Ch'anghsia limestone, or the Upper Cambrian of the northern type, is a bluish gray limestone, accompanied by intraformational (edgewise) calcareous conglomerate (Wirkkalk) which suggests a shallow water deposition. Trilobites are the commonest fossils, such genera as <i>Chuangia</i> , <i>Pagodia</i> , <i>Ptychaspis</i> , and <i>Illaenurus</i> predominating. The Kushan shale is a green shale accompanied by thin shaly to conglomeratic limestones, and contains abundant trilobites, pygidia of <i>Drepanura</i> being especially predominant. Large slabs of shaly limestone, covered with pygidia, cranidia, and cheeks of trilobites, are often found and make excellent museum exhibits. <i>Agnostus</i> and <i>Blackwelderia</i> are common. Smaller slabs, and shale containing <i>Obolus</i> (<i>Westonia</i>) <i>blackwelderi</i> are also abundant. The Ch'anghsia limestone consists of various shades of gray and frequently oolitic limestone especially in the lower part. Some shale also occurs but the formation is predominantly calcareous. The limestone is very fossiliferous, containing much trilobites. Such genera as <i>Ptychoparia</i> , <i>Inonyia</i> , <i>Agraulos</i> and <i>Anomocarella</i> predominate in the lower part; <i>Dolichometopus</i> becomes characteristic upward. The higher part is characterized by <i>Dorypyge</i> , <i>Crepicephalus</i> , <i>Anomocarella</i> , and <i>Dolichometopus</i> . The uppermost part is characterized by <i>Blackwelderia</i> , and <i>Damesella</i> , with spinous pygidia. The Mant'ou shale is the oldest known Cambrian bed of North China. It consists of yellowish or greenish shale which rests directly upon the peneplaned surface of older rocks. Some thin beds of earthy limestone occur, but for the most part the unit consists of buff, maroon, yellow, and brown shale. The most typical fossils are <i>Obolus asiatica</i> , <i>Helcionella rugosa</i> , var. <i>chinensis</i> , <i>Redlichia chinensis</i> , etc.	
	UNCONFORMITY			
PRECAMBRIAN	Taishan complex	 Granite gneiss, mica schist and amphibolite	The Taishan complex consists chiefly of granite gneiss and gneisses of unknown origin and character, associated with metamorphic schists, such as mica schist, amphibolite, etc. All the metamorphics are intruded by granite which is relatively young although in part probably Precambrian. The unconformity between the Taishan complex and the overlying Mant'ou shale is very distinct throughout Shantung.	
		(Column not drawn to scale)		