GEOLOGIC COLUMN AND UNIT DESCRIPTION

AGE	ROCK UNIT	LITHOLOGY; THICKNESS WHERE KNOWN	UNIT DESCRIPTION
QUATERNARY	Alluvium	Qal — Sand, gravel, clay and silt; thickness more than 10 meters	Alluvium, consisting of fluviatile sand, gravel, clay and silt, is distributed throughout the narrow drainage basins along the rivers and covers the flood plain of Hopei.
	UNCONFORMITY		
	Diluvium	Qdl — Loess, redeposited loess, sand and gravel; thickness 30 to 50 m	Diluvium consists of primary aeolian loess, secondary fluvio-aeolian loess, sand and gravel. The deposits distributed widely in the vicinities of Tsun-hua (遵化), Tseng-chuang (曾庄) and Yung-ning (永宁) are 30 m to 50 m thick or more.
	UNCONFORMITY		
MESOZOIC	Cretaceous formation	Mk — Conglomerate, sandstone, tuff and shale; thickness more than 300 m	The Cretaceous formation is called the "Ch'eng-te conglomerate" in Manchuria and the "Tuff conglomerate" in North China. The formation near Ch'eng-te and Ku-pei-k'ou (古北口) consists mainly of reddish purple conglomerate interbedded with thin tuffaceous sandstone which is predominant in the upper and the lower parts. The pebbles of conglomerate are roundly eroded igneous rocks ranging in age from Cretaceous to Lower Precambrian, including rhyolite, trachyte, quartz porphyry, dacite, andesite, granite, gneiss, and vein-quartz. Owing to wind erosion and joints, the conglomerate forms a striking landscape. The formation dips gently at less than 10°. The formation near Yung-ning consists of variecolored conglomerate and tuff with thin-bedded red sandstone and shale. The formation is probably lower to Middle Cretaceous in age.
	UNCONFORMITY		
	Cretaceous rhyolite	r — Rhyolite, trachyte, dacite and obsidian	Cretaceous rhyolite, occurring as flows and sheets, consists mainly of rhyolite accompanied by trachyte, dacite and obsidian. It is locally interbedded with tuff, breccia, sandstone and shale, and defined as Lower Cretaceous in age.
	Cretaceous volcanic complex	Mjv — Sandstone, shale, breccia and rhyolitic tuff	The Cretaceous volcanic complex consists of sandstone, shale, breccia and rhyolitic tuff. The complex is almost all disconformably overlain by rhyolite flows, and, as it rests on the Mesozoic and Paleozoic formations, its age is assigned to Lower Cretaceous.
	UNCONFORMITY		
	Granite porphyry and quartz porphyry	gp: granite porphyry qp: quartz porphyry	Granite porphyry near Pei-ying-fang (北营房) intrudes the Jurassic volcanic complex, the Jurassic andesite and the Upper to Lower Paleozoic formations. Quartz porphyry, sporadically exposed as dikes in North China, intrudes the pre-Jurassic granite (g_2), the Sinian system and the granite gneiss (ggn). The rock is a bringer of metal ore deposits.
	Cretaceous granite	g3 — Biotite granite, hornblende-biotite granite, granodiorite and alkali-granite	Cretaceous granite in the Manchurian side of the map sheet is generally porphyritic biotite granite or hornblende-biotite granite. The rock near Ming-ming-wa (明明洼) is probably an alkali-granite (S. SATO, 1933). The rock near Yang-fang (阳坊), 22 km northwest of Pei-p'ing comprises granodiorite and hornblende-biotite granite, contact-metamorphosing the Upper Jurassic volcanic complex (Mjv) and the Ordovician limestone (Plo).
	Basic igneous rocks	d — Gabbro and hornblendite	Cretaceous basic igneous rocks, near San-ch'a-k'ou (三叉口), consist of gabbro and hornblendite and intrude the Upper Jurassic volcanic complex (Mjv) and the andesite (Mja).
	INTRUSIVE CONTACT		
	Jurassic-Cretaceous formation	Mjk — Sandstone and shale; thickness 550 m	The Jurassic-Cretaceous formation near An-chiang-t'un (鞍匠屯) consists of alternating sandstone and shale (500 m thick), and basal tuffaceous sandstone (50 m thick). The sandstone is ligit yellow, medium-grained, and each layer in the alternation is 20 to 30 cm thick; the shale is dark gray and muddy, each layer being 2 to 5 cm thick. The shale in the hill west of An-chiang-t'un yields plant fossils including Cladophlebis sp.
	UNCONFORMITY		
	Upper Jurassic formation	Mju — Sandstone, shale, conglomerate and coal; thickness more than 200 m	The Upper Jurassic formation consists of alternating light gray to dark gray tuffaceous sandstone and black compact shale, accompanied by thin coal seams and basal conglomerate. The formation rests disconformably on the Jurassic volcanic complex. It forms a monoclinal structure near Shih-mu-hsia (石门下) and a synclinal structure near Ying-shou-ying-tzu (迎手营子).
	UNCONFORMITY		
	Jurassic andesite	Mja — Cryptocrystalline andesite, basaltic andesite, andesite porphyry, andesitic agglomerate and pyroclastic breccia	Jurassic andesite occurs mainly as flows and locally as sheets. It consists of cryptocrystalline andesite, basaltic olivine andesite and andesite porphyry, generally associated with andesitic agglomerate and pyroclastic breccia.
	Jurassic volcanic complex	Mjv — Agglomerate, andesite, tuff, conglomerate, sandstone, shale and breccia	The Upper Jurassic volcanic complex, known as the "Yiaochishan formation"(姚旗山组) near Pei-p'ing (1,000 to 1,500 m thick) or the "Lower Jehol formation" near Ch'eng-te (400 to 2,000 m thick), consists of alternating agglomerate, andesitic tuff, agglomeratic tuff, andesite flows, and agglomeratic conglomerate, accompanied by sandstone, shale and breccia in the basal part. The pebbles of the breccia are limestone near Pei-p'ing, and gneiss, quartzite and gabbro near Liang-ch'en-tang(梁辰塘). Rocks of the complex are contemporaneous with the Jurassic andesite (Mja) and are allowed associated with the latter.
	EFFUSIVE AND INTRUSIVE CONTACT		
	Middle Jurassic formation (Chiulungshan series)	Mjm — Shale, sandstone and conglomerate; thickness 500 to 850 m	The Middle Jurassic formation, or the "Chiulungshan series"(九龙山系), is 500 m to 850 m thick near Pei-p'ing, and consists of alternating greenish violet shale, sandy shale, sandstone and tuffaceous sandstone, with basal conglomerate. Purple tuffaceous sandstone predominates upward. Fine-grained agglomerate at the top is indistinguishable from the agglomerate of the Upper Jurassic volcanic complex. The formation rests disconformably on the Men-tou-kou series (Mb), and its age was defined by L. H. YEN (1960) as Low to Middle Jurassic. The formation is also exposed in the vicinity of Yang-chia-chuang (杨家庄) near Pei-ying-fang.
	DISCONFORMITY		
	Diabase porphyrite	P — Hypersthene diabase porphyrite	Diabase porphyrite, occurring as sheets, is known in North China and Manchuria. It ranges in age from Jurassic to Triassic. The rock near Pei-p'ing, consisting of hypersthene diabase porphyrite, intrudes the Mentoukou series (Mm), the Permian-Triassic formation (PuR), and the Permian-Carboniferous formation (Pu). The rock near Yu-shu-kou, consisting of light gray porphyrite, is 30 m thick and intrudes the Permian-Triassic formation and the Permian-Carboniferous formation. It is marked with columnar joints.
	INTRUSIVE AND EFFUSIVE CONTACT		
	Jurassic-Triassic formation (Mentoukou series)	MR — Sandstone, shale, conglomerate and coal	The Jurassic-Triassic coal-bearing formation, or the "Mentoukou series"(門头沟系), consists of sandstone, shale, sandy shale, conglomerate, and coal seams. The series near Men-tou-k'ou (refer to Pei-p'ing sheet, NJ 50-2) is 1,000 m thick, and contains 30 coal seams 10 of which are workable. The series gradually thins northward, and is 100 m thick near Pai-chia-t'un(白家疃). The formation may thin out in the vicinity of YÜ-shu-kou. The upper part of the series near Men-tou-k'ou yields plant fossils such as Ctenozamites browniana, Cladophlebis sp., Elatides sp., and Pterophyllum sp. (Y. O. HALLE in L. F. YEH, 1960). The series near Chai-tang(斋堂) yields Czekanowskia rigida Heer, Phoenicopsis speciosa Heer, Pityophyllum longifolium Nath, Podozamites lanceolatus L. et H. and Asplenium whitbiense Brongn. (M. KAWADA and H. MORITA, 1937).
	UNCONFORMITY		
	Pre-Jurassic granite	g2 — Biotite granite	Pre-Jurassic granite, probably Triassic in age, is sporadically exposed along the Great Wall and near Chung-kou-men (中口门) along the Tang Ho (唐河). The rock is gray medium-grained granular biotite granite, and is characteristically nonporphyritic in texture. It intrudes the Sinian system (pSn), the Gneiss complex (gn) and the Lower to Upper Paleozoic formations, and is intruded by the Cretaceous granite (g_3) and the quartz porphyry (qp).
	INTRUSIVE CONTACT		
	Permian-Triassic formation	PuR — Sandstone, shale and clay; thickness 350 to 500 m	The Permian-Triassic formation, or the "Hungmiaoling series"(红庙岭系), is less than 350 m thick near Pei-p'ing; it is the "Hsinglunghsien sandstone" (兴隆县砂岩), 500 m thick, near Pei-ying-fang. It consists of gray, light yellow or green quartzose sandstone interbedded with thin layers of shale and red clay at the base, and is locally intruded and contact-metamorphosed by diabase porphyrite.
	DISCONFORMITY		
PALEOZOIC	Upper Paleozoic formation	Pu — Sandstone, shale, conglomerate, limestone and coal; thickness 330 to 530 m	The Upper Paleozoic formation, or the "Yangchiatun (杨家屯) coal series" near Pei-p'ing, or the "Liuho (柳河) coal series" near Lao-yeh-miao (老爷庙) and Huang-yai-kuan (黄崖关), consists of sandstone, shale, conglomerate, limestone and anthracitic coal. It is Permo-Carboniferous in age and is intruded by the diabase porphyrite. The formation is divided in descending order as follows:
	Lower Paleozoic formation	Pl — Pl, undifferentiated Lower Paleozoic formation: limestone and shale; thickness unknown Plo, Ordovician formation: limestone and shale; thickness 530 m Plc, Cambrian formation: limestone and shale; thickness 250 to 400 m	
	UNCONFORMITY		
PRECAMBRIAN	Upper Precambrian formation (Sinian system)	PCu — Limestone, shale, phyllite, slate, quartzite, sandstone and conglomerate; thickness about 2,500 m	The Upper Precambrian formation, or the Sinian system, rests unconformably on the gneiss complex (gn) and is divided into the upper and lower parts. The upper part consists, in descending order, of limestone, siliceous limestone, shale, an alternation of siliceous phyllite and calcareous slate, and red slate. The lower part consists, in descending order, of thick-bedded quartzite, siliceous sandstone and local basal conglomerate. The system may be no less than 2,500 m thick.
	UNCONFORMITY		
	Crystalline schist	Sch — Mica schist, hornblende schist, limestone and quartzite; thickness unknown	The crystalline schist, or the Wutai system, consists of mica schist and hornblende schist accompanied by limestone and quartzite. The rock near T'ai-yang-kou (太阳沟) appears to be a contact metamorphosed facies of the Sinian system.
	UNCONFORMITY		
	Gneiss complex	mgn — gn: metagneiss and granite gneiss mgn: metagneiss, injection gneiss, migmatite gneiss and paragneiss ggn: orthogneiss and granite gneiss	The gneiss complex is lithologically divided into two groups, metagneiss (mgn) and orthogneiss (ggn). The metagneiss group, consisting of biotite metagneiss and hornblende-biotite metagneiss, including injection gneiss, migmatite gneiss and paragneiss, is generally distributed in the northern side of the Great Wall, and is correlated with the Sangkan complex. The orthogneiss group, consisting of biotite orthogneiss, hornblende orthogneiss and hornblende-biotite orthogneiss, including granite gneiss with small amounts of migmatite gneiss, paragneiss and metagneiss, is generally distributed in the southern side of the Grent Wall, and is correlated with the Taishan complex. Undifferentiated gneiss complex (gn), consisting of metagneiss and granite gneiss, occurs in the northwestern part of the map area.

(Column not drawn to scale)

Locality	Yang-chia-t'un			Lao-yeh-miao		
Age	Thickness	Lithology	Fossil	Thickness	Lithology	Fossil
	300-400 m	Sandstone and conglomerate		400-500 m	Sandstone and two layers of conglomerate	
Lower Permian		Black shale with several coal seams	Calamites sp., Lepidodendron sp., Neuropteris sp., Pecopteris of lemitelioides (Brongn), Pecopteris orientalis (Schenk) (by T. W. Yang 1928)		Alternation of gray, dark gray, greenish limonite-bearing sandstone dark gray sandy shale and black shale with several coal seams	Annularia stellata, A. orientalis, Calamites cfr approximatus Brongn, C. suckowi Brongn, Cladophlebis sp., Cordaite sp., Equisetites sp., Pecopteris anthriscifolia (Goepp), P. orientalis (Schenk) Potonie, Sphenophyllum sinocoreanum Yabe, S. verticillatum (Schloth) Brongn. Phenicopsis? sp. (by F. Ueda et al 1936-1937) Sphenophyllum sp. (at Pei-ma-chuan-tzu by H. Watanabe 1934)
	0-30 m	Shale with sandstone and conglomerate at the base	Spirifer (choristites) myatschkowensis Frecks Productus cf. taiyuanfensis Grabau. P. cf. semireticulatus Chao, Deltopecten Multistriatus(?) Chao, Nuculopsis anhuaconchoides cho, Aviculopecten sp., Entolium(?) sp.	0-30 m	Shale with sandstone and lenticular limestone	

ECONOMIC VALUE

Gold

Localities of placer gold occurring in the alluvial gravel are as follows, with the thickness of auriferous gravel beds: Hsi-wan-tzu (西湾子) (4 - 5 m), 26.5 km north of Mi-yün; Tung-ta'ang-yü (东打磙峪) (4 m), 36 km northeast of Mi-yün; Ch'en-chia-yü (陈家峪) (0.5 - 1 m), 34 km northeast of Mi-yün; T'ien-chia-chuang (田家庄) (30 cm), 36.5 km northeast of Mi-yün; T'ien-ko-chuang (田各庄) (4 - 5 m), 26 km northeast of Mi-yün; Ma-chia-kou (马家沟) (1 m), 11.5 km northeast of Tsun-hua; Ta-kuai-t'i (大块地) (1.5 - 2 m), 15 km northeast of Tsun-hua and Yung-ta-ho (涌大河)(0.7 - 0.9 m) near Ma-lan-yü (马兰峪), 33 km west of Tsun-hua. The bed at Tung-ta-ho contains Au 0.4577 gr per cubic meter and its mineral reserves are estimated at 183 kgr.

Placer gold occurring in the diluvial terrace deposits along the streams of the gneiss regions is lower in grade than that in the nearby alluvial deposits. Localities are as follows: Hu-pu-chuang (护部庄) (2 - 5 m), 15 km north-northeast of Mi-yün; Yang-ko-chuang (杨各庄) (1 m), 20 km north-northeast of Mi-yün; and T'ien-chia-chuang (1 m), 36.5 km northeast of Mi-yün.

Gold-bearing quartz veins intruded the gneiss complex (gn), the pre-Jurassic granite (g2) and the Sinian system (pSn) in the last stage of the Cretaceous granite intrusion. Localities and mother rocks of the auriferous veins, with numbers corresponding to those on the geologic map, are as follows:

(1) Sau-tao-kou (扫道沟), Sinian siliceous limestone; (2) Erh-tao-kou (二道沟), Sinian siliceous limestone; (3) Ta-chuan Shan (大转山), granite gneiss; (4) Ying-liu Shan (柳条山), granite gneiss; (5) P'ing-an-chuang (平安庄), granite gneiss; (6) Tsai-chia-wa(蔡家洼), granite gneiss; (7) Ta-liang-yü (大梁峪), granite gneiss; (8) Wei-tsu-yü (韦子峪), granite gneiss; (9) Feng-chia-yü (冯家峪), pre-Jurassic granite and Cretaceous aplite; (10) Hsiang-chiang-miao (香炉庙), granite gneiss; (11) Hsi-ta-ku (西大谷), Sinian quartzite; (12) Tung-to-ku (东大谷), Sinian quartzite and metagneiss; (13) Li-t'sang-yu (李子峪) metagneiss; (14) Tsai-tzu-kou (蔡子沟), Sinian siliceous slate and quartzite; (15) Shui-chuan-kou (水泉沟), Sinian siliceous phyllite; (16) Ping-kan-kou (饼干沟), Sinian clay slate and siliceous phyllite; (17) Hsi-liang-tzu (西梁子), metagneiss; (18) Pai-ma-kuan (白马关), metagneiss; (19) Leng-chu-t'ou (冷猪头), granite gneiss; (20) Ch'an-k'ou (禅口), granite gneiss; (21) Shu-ling (树岭), pre-Jurassic biotite granite; (22) Yüan-shu (元山), pre-Jurassic biotite granite; (23) Yüan-ku-chuang (元古庄), granite gneiss; (24) Ch'iao-yang-an (桥杨庵), granite gneiss; (25) Wang-yeh-ling(王爷岭), granite gneiss; (26) San-tao-kou (三道沟), granite gneiss; (27) Lao-hu Shan (老虎山), granite gneiss; (28) Chiao-chia-kou (焦家沟), granite gneiss; (29) Kuan-t'ang-kou (管堂沟), granite gneiss; (30) P'ing-shan-ting (平山顶), granite gneiss; (31) Tao-liu-shui(倒流水), granite gneiss; (32) Fen-shui-ling (分水岭), pre-Jurassic granodiorite; (33) Tuan-shu-kou (段树沟), pre-Jurassic granite and Sinian rocks; (34) Ta-sa-ti (大沙地), pre-Jurassic granite; (35) Lou-tzu-yu (楼子峪), pre-Jurassic granite; (36) Hsi-shui-yu (西水峪), pre-Jurassic granite; (37) Tao-yuan (桃园), pre-Jurassic granite; (38) Ma-chia-chuang-pei Shan(马家庄北山), pre-Jurassic granite.

Silver

(1) At Yin-yeh-ling(银叶岭), 8 km south-southeast of Mi-yün, gold and silver bearing quartz veins occur along the joints of Cretaceous felsite dikes which intrude Sinian siliceous limestone. The ore deposit is poor in quality and mineral reserves.

(2) At Chiao-chi Shan (鲛矶山), 30 km east-southeast of Huai-jou (怀柔), a gold and silver impregnation deposit occurs in Sinian siliceous limestone and clay slate intruded by Cretaceous felsite and dacite dikes which are the ore bringers.

Lead

At Hua-t'a (花塔), 15 km west of Ch'ang-p'ing (昌平), lead occurs as impregnation ore in Sinian siliceous limestone intruded by Cretaceous porphyritic granite which is the ore bringer. The limestone bed, 10 - 20 cm thick, strikes N 70° E, dips 55° S, and contains grains of sreenogrpite and galena. The ore contains 34.82% Pb, 15.54% SiO_2, 3.13% Fe, and 6.41% S. The deposit is 80 m long and 8 cm wide and its probable mineral reserves are estimated at 384 tons.

Manganese

At Hsi-hu-tsun (西湖村), 13 km northeast of Ch'ang-p'ing, manganese occurs in rhodonite-bearing quartz veins, a contact deposit between Sinian crystalline limestone and Cretaceous felsite or plagi-aplite. The average grade is 45.50% Mn. The probable mineral reserves containing 45.5% Mn are estimated at 6,970 tons.

Tungsten

(1) At Huang-kua Shan (黄瓜山), 10 km west of Chi-hsien,(蓟县), tungsten occurs in WO_3-bearing quartz veins which intruded into the pre-Jurassic medium-grained biotite granite during the Cretaceous period. Analytical results show the contents are as follows: North vein (20.5 cm wide), 4.49%; East vein (21 cm wide), 4.34%; South vein (29 cm wide), 3.30%; West vein (53.1 cm wide), 5.87%. The total probable mineral reserves are estimated at 5,425 tons in which 241 tons of tungsten is contained.

(2) At Ta-hsieh-tzu Shan (大蝎子山), 10 km west-southwest of Chi-hsien, tungsten occurs in WO_3-bearing quartz vein intruding the pre-Jurassic granite. The vein strikes N 85° W, dips 40 to 55° S, is 80 m long and 8 to 9 cm wide. The total average grade is 7.54% WO_3, and probable mineral reserves are estimated at 276 tons, in which 88 tons of tungsten is contained.

Mica

At Hsiao-hsin-k'ai-ling (小新开岭), 34 km northeast of Mi-yün, a mica deposit occurs in a dike of Cretaceous pegmatite intruding injection gneiss. The dike is 15 m long, 2 m wide, and contains muscovite, 30 cm in diameter, and biokite 3 to 4 cm in diameter, although the mineral reserves are poor.

Iron

(1) At An-ttu-ling (鞍子岭) near Yeh-hsien Shan (叶山山), 3 km north of Mi-yün, a contact-metasomatic magnetite deposit occurs between the dikes of Cretaceous diorite and porphyrite and Sinian slate and sandstone. The mineral reserves are poor.

(2) At Lang-tan-chuang (郎担庄), 11 km west-northwest of Tsun-hua, dynamo-metamorphosed magnetite gneiss extends N-S. The total average grade is 38.80% SiO_2, 36.80% Fe, 0.03% Mn, 0.122% P, 0.005% S, and the specific gravity is 3.334. Probable mineral reserves are estimated at 58,800,000 tons.

(3) At Tieh-liang-tzu (铁梁子), 6 km north of Chi-hsien, hematite occurs in the Sinian clay slate. The quality is good but the mineral reserves are poor, being only about 3,000 tons.

Coal

The coal-bearing Permian formation intruded by porphyrite and porphyry dikes is found in the following four districts.

(1) Pei-ma-chuan-tzu coal field. The formation strikes NE for a distance of 5 km with an outcrop width of 1.5 km, and dips 20° to 50° SE. There are three workable coal seams, with respective thicknesses of 2.4 m, 2.1 m and 0.7 m, in descending order. The coal is bituminous and caking. The analytical results revealed, 1.32 to 1.79% water, 32.77 to 39.38% volatile matter, 43.62 to 46.30% fixed carbon, 13.06 to 21.85% ash, and a calorific value of 6,197 to 7,071. The total coal reserves are estimated at 20,220,000 tons (proven reserves are 5,280,000 tons and probable reserves are 14,490,000 tons).

(2) Lao-yeh-miao coal field. The formation strikes E-W for 6 km with an outcrop width of 1.9 km; it dips generally 20° to 50° S. It is disturbed by porphyry intrusions and forms two anticlines whose axes trend E-W in the northern part of the coal field. The thickness of three workable coal seams are: upper seam 2 to 3 m, middle seam 2 to 6 m, and lower seam 1 to 2 m. The coal is bituminous and weakly caking. The analytical results show 3.55% water, 24.51% volatile matter, 53.56% fixed carbon, 18.38% ash, and a calorific value of 6,259. Total coal reserves are estimated at 21,060,000 tons (proven reserves are 10,530,000 tons and probable reserves 10,530,000 tons).

(3) Yang-chia-t'un coal field. The formation is locally metamorphosed into schist and quartzite by Cretaceous igneous intrusions from which some contact minerals such as pyrite, garnet, andalusite and chiastolite resulted. The coal is anthracitic and the seams locally vary in number and thickness. Workable seams occur always beneath a thick bed of conglomerate in the lower part of the formation.

(4) Huang-yai-kuan coal field, 22 km north of Chi Hsien. The formation is intruded by quartz porphyry, and is deficient in coal reserves.

Limestone

The Chang-chün-ling (张军岭) Ordovician limestone near Chun-chuang was formerly quarried for smelting the Hsuan-lung iron ore. Mineral reserves are estimated as follows: Limestone containing less than 2% silica amounts to 6,000,000 tons, 2% to 3% silica is 6,000,000 tons, and 3% or more silica is 4,000,000 tons. Limestones of the Sinian, Cambrian, and Ordovician formations are calcined for the local lime industry.

Ground water

The level of shallow-seated ground water in the flood plain northeast of Pei-p'ing lies at the depth of 4 to 10 m. The quality of the water is good compared to the rest of China although the content of Ca, SO_4 and Cl is rather high.

The deep-seated aquifer lies at a depth of less than 50 m, becoming shallower toward north. The underground Quaternary deposits consist of an assemblage of light gray quartz sand, yellowish brown loessic mud and vari-colored gravel. The quartz sand is the thickest unit and yields a large number of Planorbis sp. The Pleistocene red clayey mud overlain by the Quaternary deposits is found at the depth of 70 to 120 m near Pei-p'ing. Ground water is favorably preserved in the vari-colored gravel bed which covers the impermeable red clayey mud. Wells sunk in the flood plain were stopped upon encountering the sticky clayey mud bed. The depth to the surface of the bedrock is unknown.

The ground water is very abundant. The quality is the best in North China: the Cl content is less than 50 mg/l and the hardness is about 170 ppm.

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