A REVIEW OF THE GEOLOGY OF SOME KIMBERLITES IN CHINA

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Extended Abstract

A. INTRODUCTION.

The kimberlites of Mengyin in Shandong Province, of Hebi in Henan Province and of Fuxian in Liaoning Province are only three of a number of kimberlite provinces that are known in China. These three groups of kimberlites have been studied intensively in the last decade and they are considerably better documented than are most other groups in China. Many small kimberlite dykes also occur in Zhenyuan in Guizhou Province and there are some intrusions in the Yanbei area of Shanxi Province and in the Jingshan area of Hubei Province that may be either kimberlites or related rocks. In the Yuanshui river in Hunan Province diamonds and pyropes have been found in alluvials, (these are also known as the Changde diamond deposits), and in the Bachu area of the Xinjiang Uighur Autonomous Region. To date no kimberlites have been found in either of these areas, (see Fig.).

The three kimberlites provinces reviewed occur on the Sino-Korean craton which is of Archaean age. The Yangzi and Tarim cratons, on which the Guizhou kimberlites and the Bachu mineral anomalies occur respectively, were formed in the Proterozoic. The Sino-Korean craton is mostly covered by Palaeozoic and younger sediments, some of which contain diamonds. This, and the possible early Palaeozoic age of some of the kimberlites described in this paper, present interesting problems to the diamond geologist.

B. MENGYIN KIMBERLITES.

The Mengyin kimberlites are located in Mengyin County of Shandong Province. They comprise 47 groups of dykes and 11 small pipes, the first of which were found in 1965 by a heavy mineral survey. An open pit mine has been developed around two small pipes, referred to as Shengli 1, and it is possible that one or more of the other pipes will be mined in the future. The dykes trend between 15° and 35° and in most cases dip steeply to the west. Their strike parallels the major Tanlu fault zone, (see Fig.), that separates the Archaean basement of western Shandong from the Proterozoic rocks in the eastern part of the province. Individual dykes have a strike length of up to several hundred metres, the maximum being 1.4kms, and an average thickness of 20 to 40cms although the maximum width is 3m. The Mengyin kimberlites can be divided geographically into three fields which are called, from SW to NE, Changmazhuang, Xiyu and Peli. The three kimberlite fields are arranged in sinistral en echelon pattern. The Changmazhuang and Xiyu fields have small clusters of pipes at their centers. The pipes are irregular in outline with strong structural control in the NNE and NW joint directions of the Archaean gneiss country rock. The largest pipe, Hongqi 6 in the Xiyu field, measures 220m by 90m and has a surface area of 1.98 ha. The pipes decrease in size with depth and their roots have been shown by extensive drilling to be dykes, which also trend in a NNE direction. It is estimated that there has been between 1km and 1.5kms of erosion since kimberlite emplacement.

Age determination using the K-Ar method on whole rock kimberlite samples and on phlogopites give two groups of ages. Whole rock determinations suggest a late Mesozoic age of 77 to 88 m.y., while the phlogopites give a possible range of 234 to 554 m.y.

C. HEBI KIMBERLITES.

The Hebi kimberlites lie to the west of Hebi City in Henan Province, (see Fig). They were found in 1971 by a combination of detailed geological mapping and indicator mineral prospecting. There are 79 bodies in this kimberlite province. Most of them are dykes, some are sills but no pipes have been found to date. The kimberlites occur in a belt that trends between 5° and 15° and measures 20kms by 6.5kms. This belt is 25kms to the west of, and parallel to a major NNE striking fault zone, the Taihang Mountain fracture. The dykes are several tens of metres long and 10 to 15cms wide. The longest individual dyke has a strike length of 800m. Both the dykes and the sills are intruded into marls, dolomites and limestones of Cambrian and Ordovician ages. The sills occur in a marl at the boundary between Lower Ordovician dolomite and Middle Ordovician limestone. The age of these bodies has not been established radiometrically but they contain abundant igneous xenoliths, which are thought to be of late Mesozoic and early Cenozoic age, suggesting kimberlite emplacement in the early Cenozoic.

D. FUXIAN KIMBERLITES.

The Fuxian kimberlites occur mainly in the Toudaogou area of Fuxian county, Liaoning Province, (see Fig.), and were found in the early 1970's by both ground magnetic surveys and heavy mineral sampling. Most kimberlites are pipe-like in outline and there is one dyke that joins two of the smaller pipes. The individual bodies trend at 70° to 30° . Most of the kimberlites occur in a downwarp at a fault intersection and are located on the eastern side of the Tanlu fault zone, where the country rock is Proterozoic sandstones overlain by Paleozoic sediment. The pipes have irregular outlines and often have faulted contacts. Pipe 50 is one of the largest pipes in the province and has a length of 275m in an E-W direction and a maximum width of 60m. The area at surface is 0.64 ha. and at 30m depth is nearly 1.00 ha. Pipe 50 contains some good quality diamonds and there is a placer deposit in a stream that drains the pipe, in which the quality of the stones is even better. The Fuxian kimberlites have been dated radiometrically using the K-Ar method on whole rock kimberlite and phlogopites. The latter datings give an age of 350 to 450m.y.

E. PETROLOGY AND MINERALOGY.

Most of the kimberlites described in this paper are magmatic varieties which are, in other parts of the world, usually associated with the root zones of kimberlite pipes. Macrocrystic kimberlite and kimberlite breccia are the most frequently found rock types although a few examples of tuffisitic kimberlite have been found, such as the Hongqi 23 body in the Mengyin province. It is possible therefore, that some of the intrusions have been eroded to the level of the diatreme-root zone transition.

Mantle and lower crustal xenoliths have been found in some of the kimberlites and differences between the nodule suites from various locations have been noted. In the Mengyin kimberlites there are peridotites, dunites, eclogites and pyrope nodules, while in the Hebi kimberlites there are peridotites and pyrope nodules. The Fuxian kimberlites contain xenoliths of peridotite, dunite, an olivine-augite rock and nodules of phlogopite glimmerite.

Mineralogically, the Mengyin, Hebi and Fuxian kimberlites are ilmenite-poor when compared with many kimberlites in other parts of the world and ilmenite is only rarely found at Mengyin and Fuxian and has never been recovered from the Hebi kimberlites. Pyrope and chromite are the most common heavy minerals found. The chromite content of some Chinese kimberlites can be very high, often exceeding the pyrope content, another feature that is unusual in kimberlites from elsewhere.

With the exception of those in Hebi province, all the other kimberlites discussed are diamond bearing to some extent. Some of the Mengyin and Fuxian kimberlites are economically diamondiferous.

