Mem. Fac Educ., Shimane Univ. (Nat. Sci.) Vol. 4, pp. 91–94, December, 1970.

GEOLOGICAL SIGNIFICANCE OF THE BOULDERS OF GNEISSIC ROCK INCLUDED IN THE KOURA FORMATION FROM SHICHIRUI DISTRICT, SHIMANE PREFECTURE, JAPAN

By

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I. Introduction

Several years ago, in the course of reconnaissance geological survey of Mionoseki district of the eastern Shimane peninsula, 20 km to the east of Matsue city, the present writer found the boulders of gneissic rocks from small cut at Shichirui area in the eastern part of this peninsula. These rocks are gneissic rocks drived from basic rocks, containing tremolite, basic plagioclase and magnetite. Judged from their lithological features, they can be correlated to the gneisses of Hida-Oki metamorphic belt. The discovery of gneissic boulders testified to the presence of mountian-land of Hida-Oki metamorphic complex in and around the present Shimane peninsula district at the dawn of the Miocene. As the occurrence of such gneissic rocks from the Shimane peninsula district seems to warrant a note from the view point of the geological genesis of green tuff regions.

II. Description

The geology of Ui-Shichirui area located to the eastern region of the Shimane peninsula are mainly composed by the Koura formation of middle Miocene. The Neogene in the Shimane penisula district situated in the central part of San-in Neogene basin is believed to represent a cycle of sedimentation named the Shinji group, and classified into the Koura, the Furue and the Matsue formations in ascending order.

Among these formations, the Koura formation is lower most formation and contains some fossils of fresh water molluscs and plant-leaves. On the contrary, there are no doubt that the Furue and Matsue formations are marine sediments from their fossils.

The Koura formation of this area is only divided into two parts of the upper and lower. Lower part consists of bedded sandy tuff and shale in alternation interculated locally with volcanic breccia of andesite. Upper part composed chiefly of volcanic breccia of rhyolite.

The boulders of gneissic rocks in question are founded as subrounded boulders, 30–50 cm. in diameter, in the conglomerate bed intercalated in above mentioned rhyolitic tuff breccia. The conglomerate bed is about 10 m in thickness. In addition to gneissic boulders, it is composed almost entirely of rounded cobbles of granitic rocks, quartz

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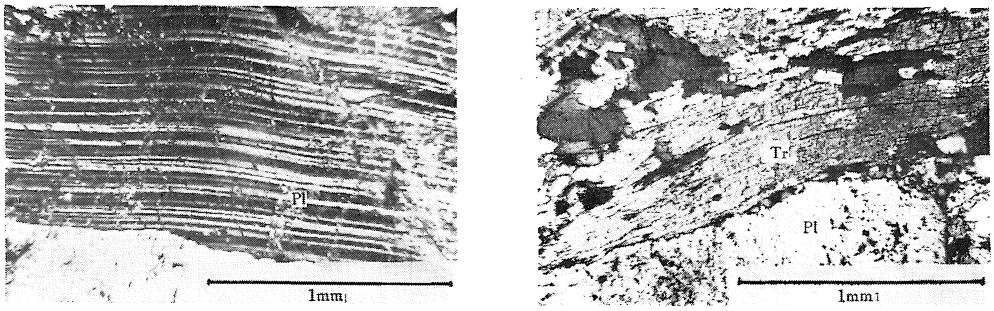

(a) (b)

Fig. 1. (a) Photomicrograph illustrating the development of bendind structure of plagioclase. (b) Photomicrograph showing the banded arrangement of tremolite and plagioclase.
Tr. Tremolite Pl : Plagioclase

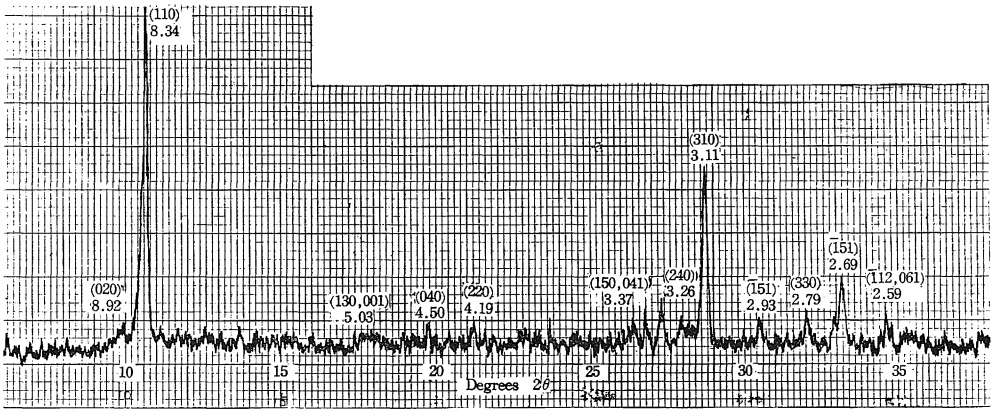

Fig. 2. X-ray diffraction pattern of tremolite of gneissic rock.

dioritic rocks and angular rhyolitic fragments in a quartzofeldspathic matrix.

These gneissic rocks are anatectic derivatives of basic rocks and shows remarkable banded structure as shown by Fig. 1. These rocks consists mainly of equigranular tremolite and calcic plagioclase, accompanied occasionally by quartz veins. As shown in Fig. 2, it is noticed that tremolite was confirmed from the X-ray powder experiment of the amphibole as the rock forming mineral of gneissic rocks. Chemical composition of these gneissic rocks are shown in Table 1.

The gneissic rocks in question have certain resemblance in lithological features to the gneissic rocks of Oki-Island, pelitic, basic, and calcareous gneisses are exposed along with granitic rocks.

Table 1. Chemical composition of Gneissic boulder.

SiO_2	53.22
TiO_2	1.14
Al_2O_3	16.78
Fe_2O_3	2.81
FeO	5.36
MnO	0.20
MgO	6.56
CaO	8.21
Na_2O	3.63
K_2O	0.48
$H_2O(-)$	0.22
$H_2O(+)$	1.12
P_2O_5	0.22
Total	99.95

III. Discussion

From the results given in foregoing chapters, these gneissic rocks are judged to be the rocks of Hida-Oki metamorphic belt, which are supposed to be the Precambrian in age. It goes without saying, Hida-Oki metamorphic belt is one of the most important structural units of Japanese Island and gneissic rocks forms a typical metamorphic belt with characteristics of the core of orogenic zone.

So far as we know at present time, this metamorphic belt extends in the E-W direction. However, it is a things much to be regretted that we could not clarified its north and south extremities, as these are hidden under the Japan sea in San-in district. It is a matter of course that the boulders of gneissic rock in question are no doubt to be the important materials to solve the relation between Hida-Oki metamorphic belt and Chugoku belt at the dawn of the Miocene. That is to say, the discovery of gneissic boulders from the Koura formation testified to the presence of mountain-land composed of Hida-Oki metamorphic complex in and around the Shimane peninsula district at the dawn of the Miocene as shown by Fig. 3.

Recent investigation on the gneissic xenoliths of Mitakesan volcano by Kojima et al. (1968) should be noticed. They considered it to be the rocks of Hida-Oki metamorphic belt underlying Paleozoic formation. If this poin tof view is quite right, the existence of a remarkable structural line between Hida-Oki metamorphic belt and Chugoku belt is expected near the present Shimane peninsula. Thus, the basin where the Koura formation was deposited must have conspicuously developed along the above mentioned structural line, The boulders of gneissic rock were derived from island left behind in the progress of sinking.

References

KOJIMA, G., NUREKI, T., and HASHIKAWA, K. (1967) : On the significance of the gneissic rocks found as xenoliths in andesite on the Sangun metamorphic belt of Yamaguchi prefecture. Jour. Sci. Hiroshima Univ., Ser. C, Vol. 5, No. 4.

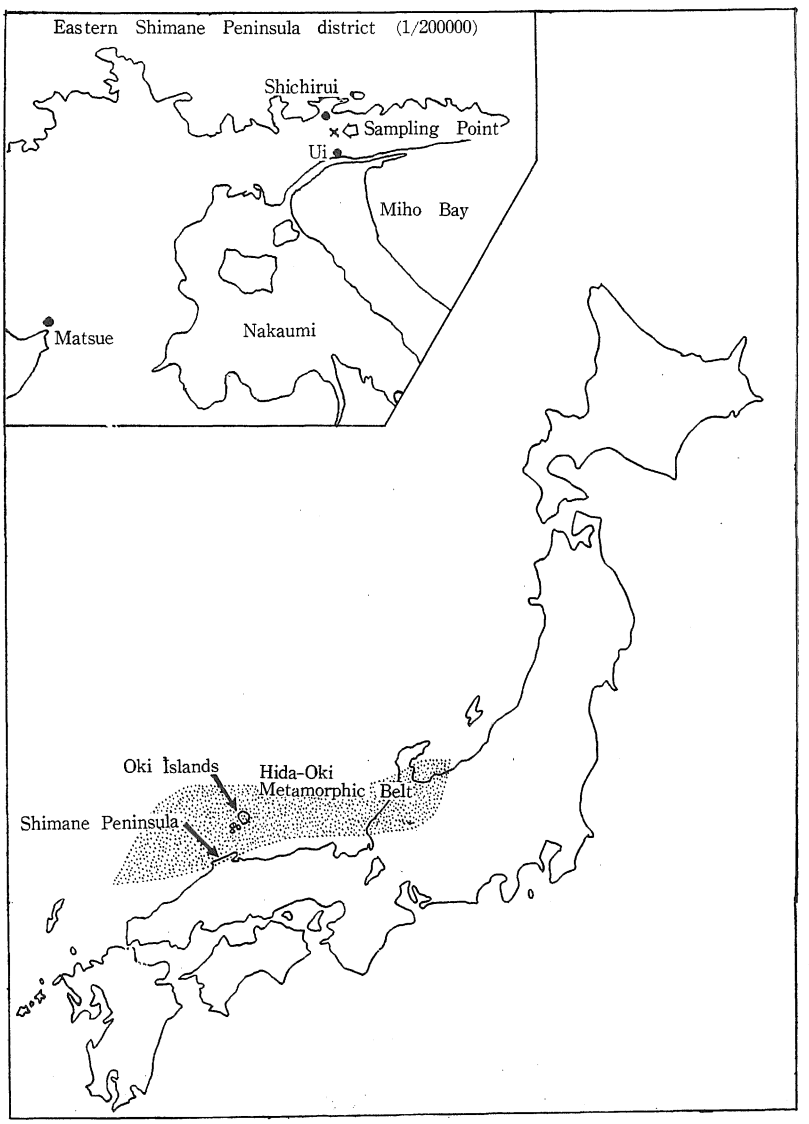

Fig. 3. Distribution of the south extremity of Hida-Oki metamorphic belt at the dawn of the Miocene.