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Petrography of the peridotite-metagabbro complex in the vicinity of Mt. Higashi-akaishi, Central Shikoku. Part I. Megascopic textures of the Iratsu and Tonaru epidote amphibolite masses

Shohei BANNO, Kazumi YOKOYAMA*, Masaki ENAMI, Osamu IWATA**, Kenji NAKAMURA and Seiei KASASHIMA

Department of Earth Sciences, Kanazawa University, Kanazawa 920

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Abstract The megascopic textures of the constituent rock-types of the Iratsu and Tonaru epidote amphibolite masses are described. The emphasis is put on the textures suggestive of gabbro origin of the masses.

Introduction

After a long period of dispute on the origin of the epidote amphibolite or "amphibolite" masses situated in the Sanbagawa metamorphic terrain in central Shikoku, it became generally agreed that they are metamorphosed gabbros (cf. Banno et al., 1976). The reasoning in support of this idea varies by different investigators and includes an intimate association of Mt. Higashi-akaishi peridotite and neighbouring epidote amphibolite masses (Shibata, 1972), and the presence of rocks with granulitic and gabbroic or flaser gabbroic textures (Shiraishi, 1975). In addition to these evidences, Banno et al. (1976) have emphasized the significance of the layers of zoisite-rich rock or zoisitite which is mainly composed of zoisite (and clinozoisite) and measures in maximum 6 meters thick, because its bulk chemistry appears to be nothing but of anorthosite in layered gabbro. Further, we often find structures suggestive of relic igneous graded bedding in massive parts of the Iratsu mass.

If zoisite- and clinozoisite-rich layer were derived from anorthosite and plagioclase-rich gabbro, we can restore the texture of original gabbro from the pattern of the distribution of white zoisite- or clinozoisite-rich part and dark hornblende-rich part, the latter being derived from pyroxene-rich gabbro, in outcrops and in hand specimens. In this way, we can recognize anorthosite, pegmatitic gabbro and gabbro as well as the

* Geological Institute, University of Tokyo, Hongo, Tokyo 113
** Kanayama Junior Highschool, Kanayama, Gifu 509-16

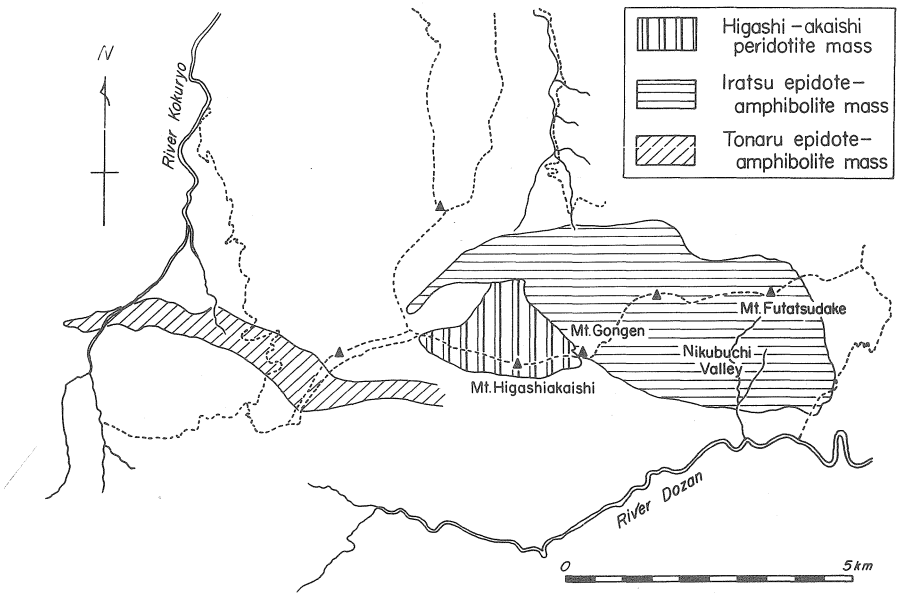

Fig. I. Index map of the Iratsu and Tonaru epidote amphibolite masses.

gradation of the structure from layered gabbro to gneissose and schistose epidote amphibolite. The main purpose of this paper is to present photographs of outcrops and hand specimens in order to show that the most widespread rock-types of these masses were derived from layered gabbro.

The megascopic textures of the metagabbro and its chemical characteristics offer the most conclusive evidences to estimate the nature of the original rocks, because the majority of the constituent minerals is of the epidote amphibolite facies and the metagabbro suffered granulite facies matamorphism prior to the Sanbagawa metamorphism (Yokoyama and Mori, 1975, and Yokoyama, 1976). We have as yet not confirmed the minerals of primary gabbro in the specimens of the masses in question. Although the bulk rock chemistry is a clue to decipher the original rock-types of the masses, it is not described in this paper. Interested reader may refer to Banno et al. (1976) which describes the chemistry of major rock-types. A more detailed table we will be available in a paper being prepared by Yokoyama.

Megascopic textures of the epidote amphibolite masses

The megascopic textures of the major rock-types of the Iratsu and Tonaru epidote amphibolite masses are described in this chapter in terms of photographs of outcrops and hand specimens. The locations of the valley and mountain refered in the text are shown in Fig.1. Unless otherwise noted, the measures in the photographs are 1 meter long, with minimum 1 mm scale and numbers at every 1 centimeters.

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YOKOYAMA, K., 1976, Finding of plagioclase-bearing ganulite from the Iratsu epidote amphibolite mass in Central Shikoku. Jour. Geol. Soc. Japan, Vol. 82, 549–552.

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Plate I.

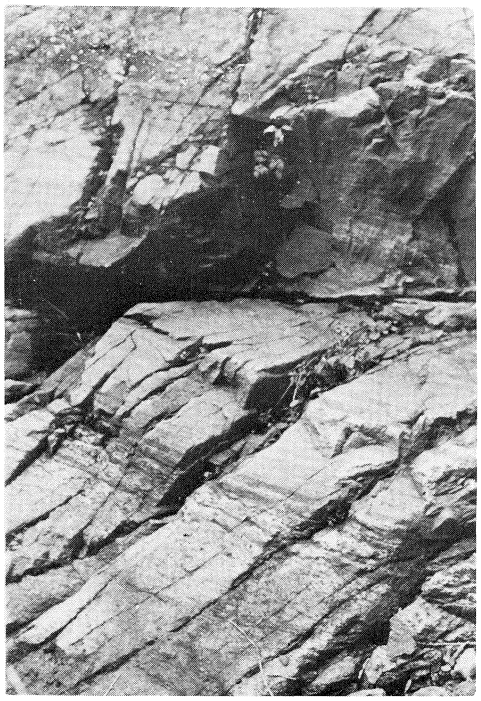
Zoisite-rich rocks: The rock consists mainly of zoisite and is always accompanied by quartz. Kyanite and paragonite are the common accessories. Other constituent minerals are hornblende and garnet. Chemically, this rock-type corresponds to anorthosite.

A: An outcrop in the Nikubuchi valley. The vertical size of photograph is approximately 6 meters.
Thin hornblende-rich layers are intercalated.

B: An outcrop in the Nikubuchi valley, showing a parallel alignment of dark hornblende-rich and white zoisite-rich layers.

C: *Specimen P-1* A hand specimen of hornblende-bearing kyanite-zoisite rock, collected from the Nikubuchi valley.

PLATE I



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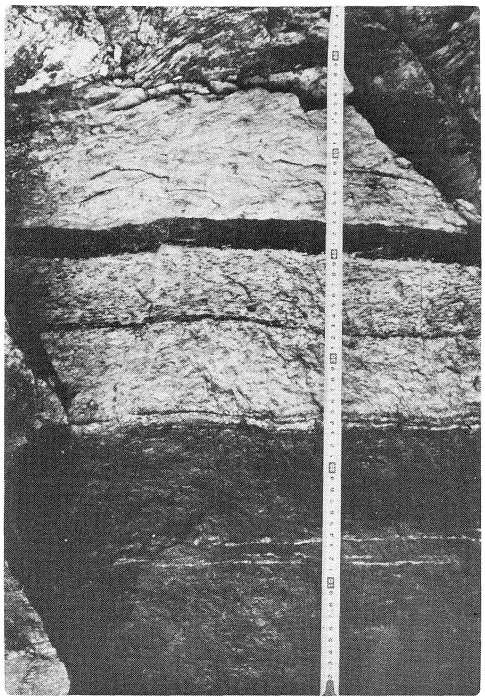

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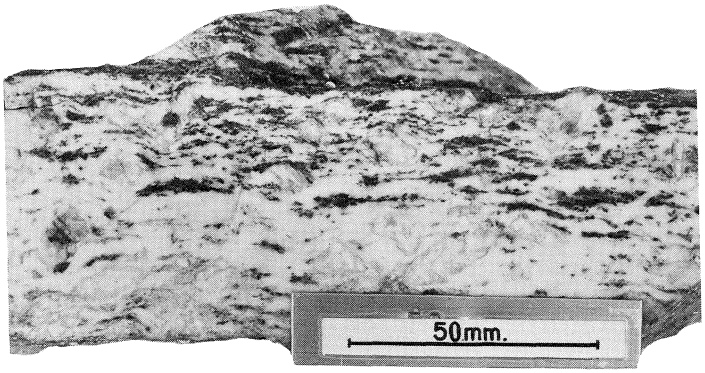


C

Plate II.

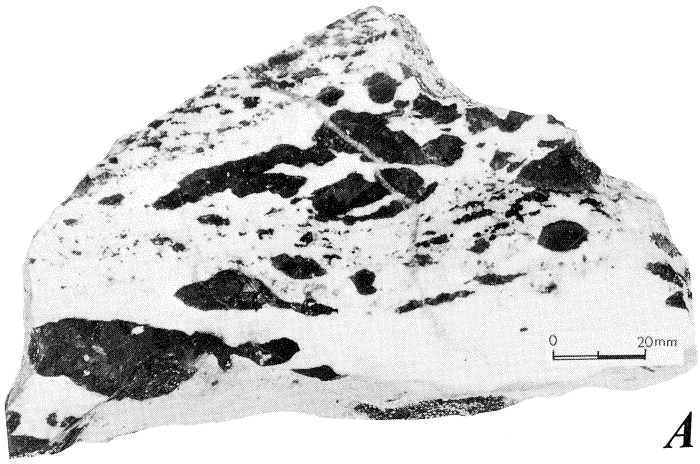
Gabbro pegmatite: The size of white and dark portions and the texture suggest that these rocks were derived from gabbro pegmatite. All samples were collected from the Nikubuchi valley.

A: *Specimen P-7* White part consists of zoisite with subordinate amount of clinozoisite, albite and quartz, and dark part of coarse-grained clinopyroxene partly replaced by hornblende along cleavages and grain boundaries. Another minor constituent is rutile.

B: *Specimen P-8* White part: clinozoisite with subordinate chlorite, dark part: mainly hornblende.

C: *Specimen P-2* White part: clinozoisite, dark part: pyroxene partly replaced by hornblende. White part in the upper part of the rock consists of grossular and zoisite.

PLATE II



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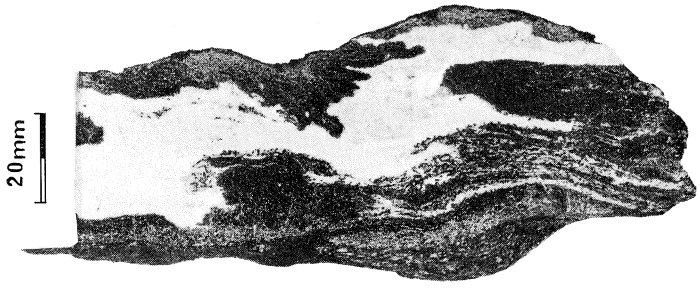


B

C

Plate III.

In the Nikubuchi valley, where outcrops shown in this plate occur, clinozoisite amphibolite often preserves gabbroic appearence, although the mineralogy is mainly of epidote amphibolite facies.

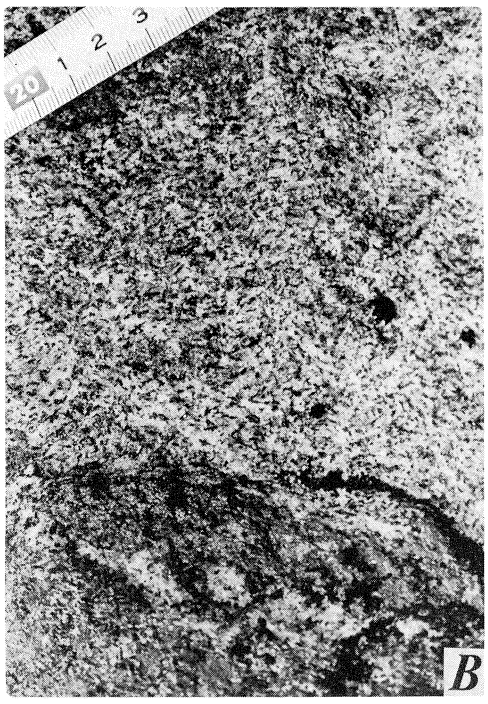
A: Gabbroic appearence of clinozoisite amphibolite.

B: Homogeneous but foliated clinozoisite amphibolite.
Clinozoisite-rich facies.

C: Coarse-grained gabbro pegmatitic part.

D: Coarse-grained garnet in clinozoisite amphibolite.

PLATE III



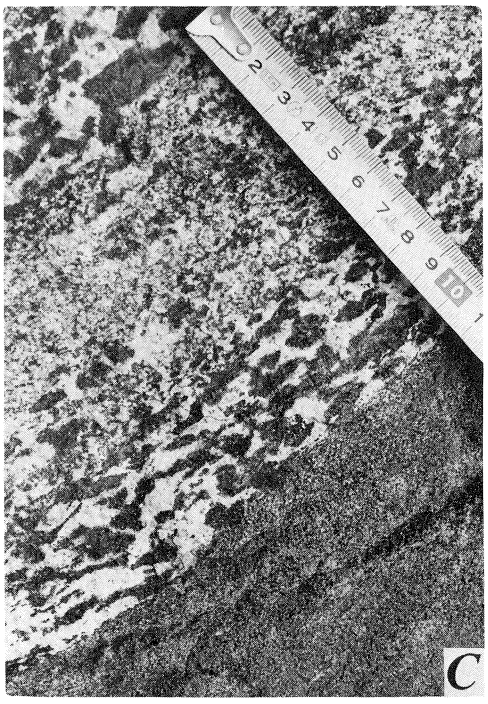
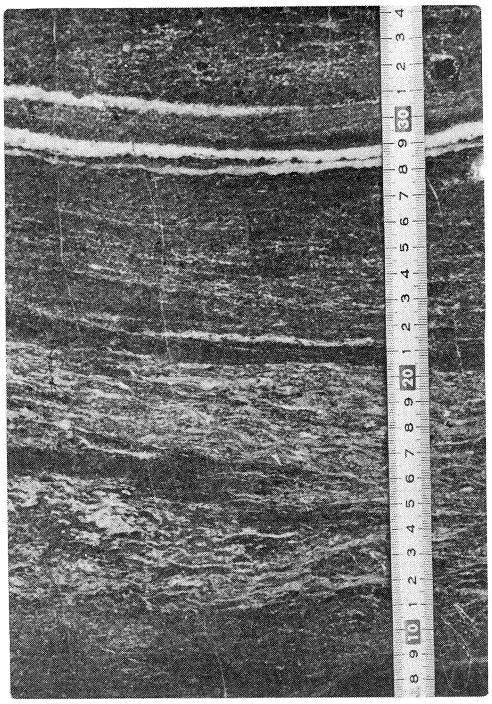


Plate IV.

The majority of epidote amphibolite masses is composed of schistose or gneissose clinozoisite amphibolite, which consists of the alternation of clinozoisite-rich and hornblende-rich layers, each measuring 10 to 30 cm thick. Photographs shown in this plate were taken at outcrops along the Kokuryo river, where the Tonaru mass is exposed.

A, B, C: Banding of clinozoisite amphibolite. White layer in C is albitite.

PLATE IV



A

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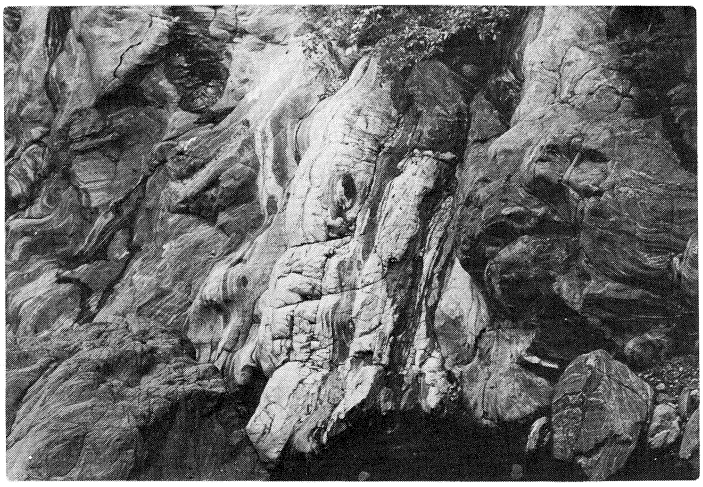


Plate V.

Close up view of schistose clinozoisite amphibolite.

A : An outcrop along the Kokuryo river. The Tonaru mass.

B : Polished surface of a hand specimen collected from Nikubuchi valley, the Iratsu mass. Garnet porphyroblasts are surrounded by dark hornblende rim.

C : A block in the Nikubuchi valley, the Iratsu mass.

PLATE V

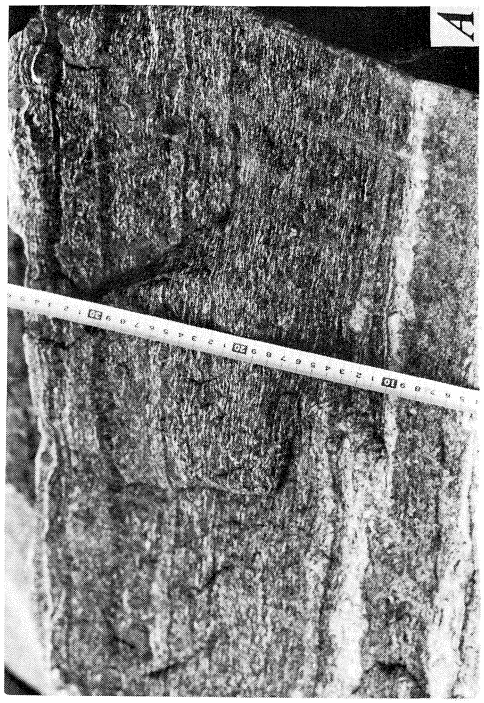


Plate VI.

Folding of banded clinozoisite amphibolite of the Tonaru mass. The photographs were taken at outcrops of the Kokuryo river.

PLATE VI

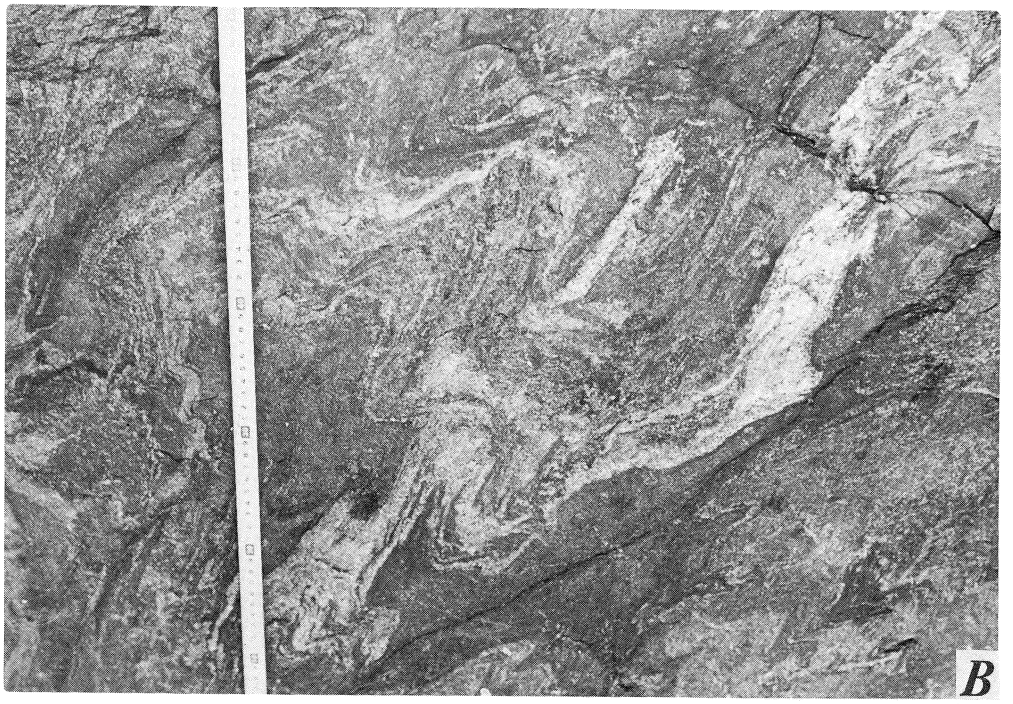


Plate VII.

Polished surfaces of hand specimens collected from the Iratsu mass.

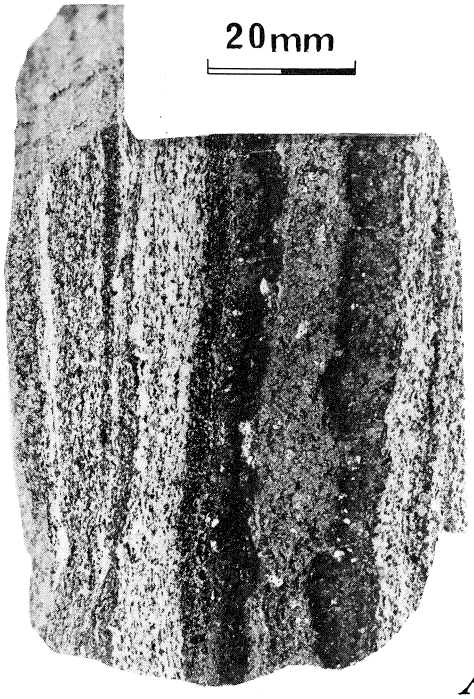
A : *Specimen P-3* Banding of clinozoisite amphibolite. White layer is composed of clinozoisite and subordinate hornblende, dark layer mainly of horblende and the central grey one consists of garnet and hornblende. Nikubuchi valley.

B : *Specimen P-5* Gneissose texture consisting of white elongated patches (white mica and clinozoisite) and dark matrix with hornblende and clinozoisite. Nikubuchi valley.

C : *Specimen P-10* Quartz eclogite collected from Mt. Gongen. Dark coarse-grained part is garnet and white part consists of quartz and muscovite. Grey matrix consists of quartz and omphacite. Hornblende occurs replacing garnet and omphacite.

D : *Specimen P-4* Gneissose texture of folded clinozoisite amphibolite. Dark part contains garnet and hornblende with subordinate clinozoisite. Northern slope of Mt. Futatsudake.

PLATE VII



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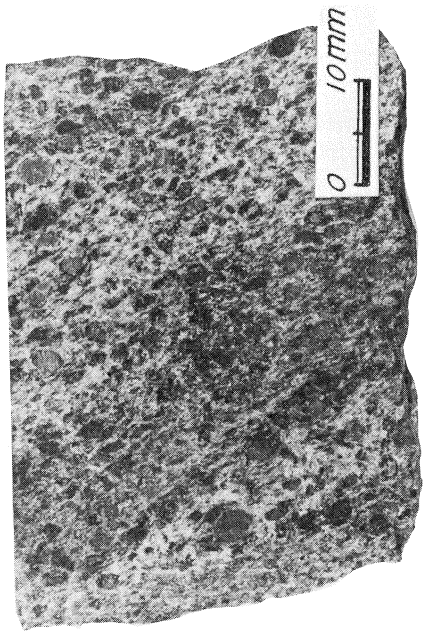

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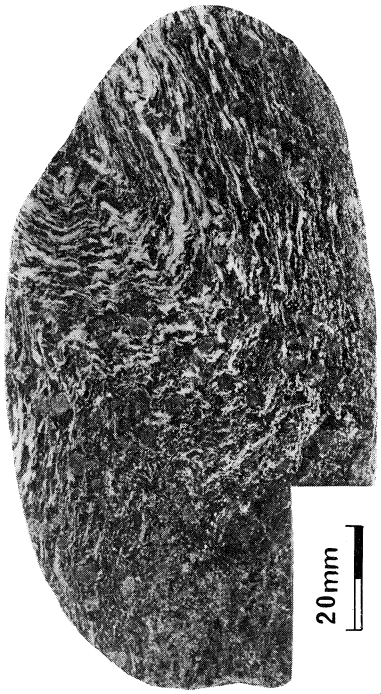


D

Plate VIII.

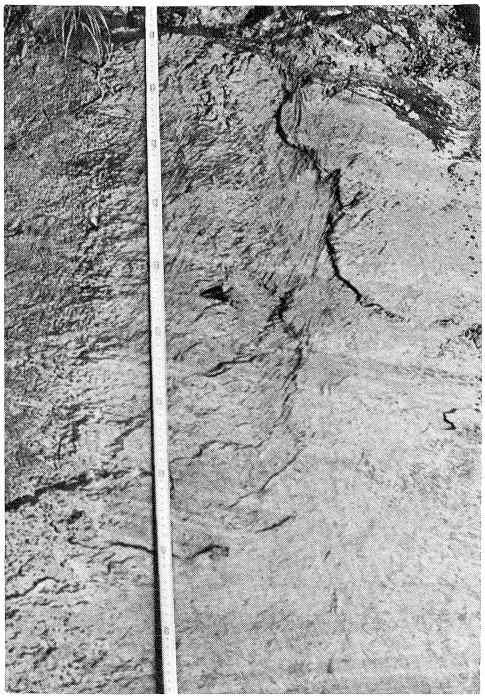
Relic igneous graded bedding, originally formed by differential settling of pyroxene and plagioclase, is now observed by the one directional change of the mode of amphibole, from hornblende-rich to clinozoisite-rich amphibolites.

A: Younging upwards. Each cycle starts from hornblends-rich clinozoisite amphibolite and gradually changes to clinozoisite-rich amphibolite and is abruptly terminated being covered by dark amphibolite. Nikubuchi valley.

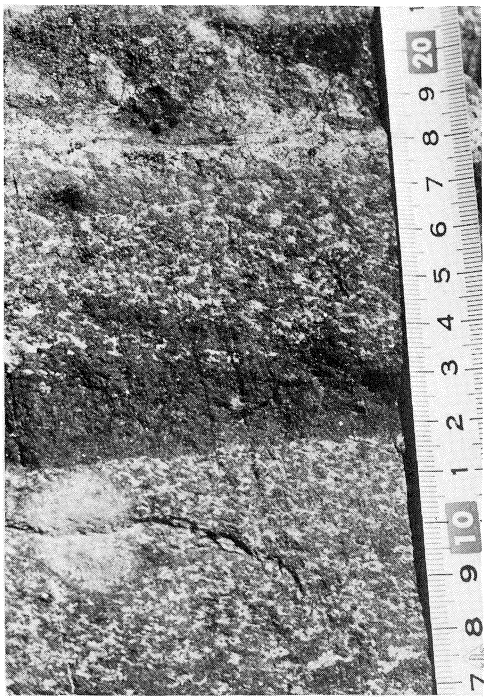
B: Close up view of graded bedding in an outcrop close to but different from that of A. Nikubuchi valley.

C: *Specimen P-6* A hand specimen showing the contact between two units of grading. Nikubuchi valley.

PLATE VIII



A



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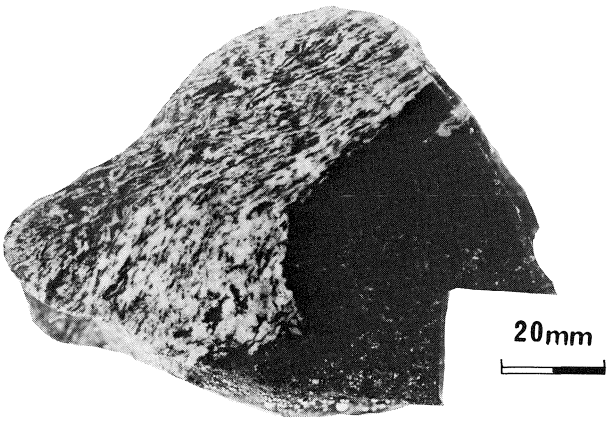


C

Plate IX.

Mode of occurence of some unusual rock types.

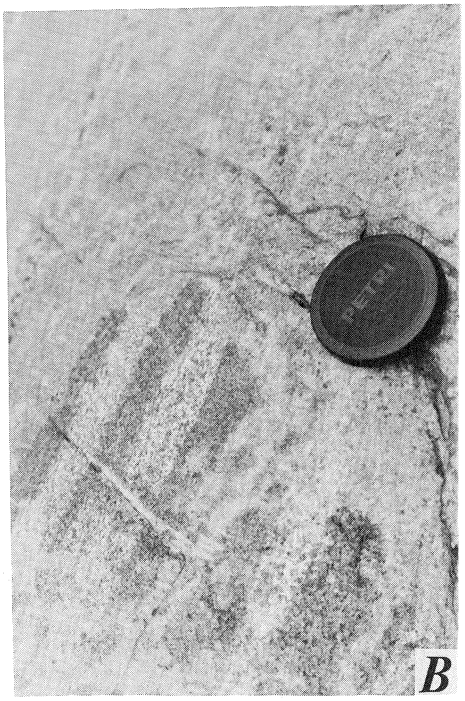
A: Pegmatitic gabbro in the Nikubuchi peridotite mass. Layer of 5 cm thick consisting of hornblende with or without relic pyroxene and zoisite occurs in peridotite. Nikubuchi valley.

B: Two pyroxenes granulite enclosed in garnet-clinozoisite amphibolite. The granulite consists of aluminous ortho- and clinopyroxenes and anorthite (An 90), the last mineral is partly replaced by the aggregate of zoisite + kyanite + quartz. Mineralogy of the granulite is described in Yokoyama (1976).

C: A limestone layer in the Tonaru mass. The limestone is concordant to the fold structure of the epidote amphibolite. An outcrop along the Kokuryo river.

PLATE IX

A



B

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