8. *A Petrological Note on the Granitic Rocks near the Cape Ashizuri, Shikoku Island, Japan (II).*

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(2) BIOTITE-QUARTZ-MONZONITE (continued):

These porphyritic microperthite[7], 1–2 cm in its dia., are so prominent in this place, that the rock has an extreme persemic appearance, and other constituents such as biotite[8], oligoclase and quartz occur interstitially.

Oligoclase (An 12–17 %) is subordinately prominent in this part; it forms general mass of the rock with quartz, and sometimes it reaches up to 5 mm or more in dia., dirty sericitized cores and lamellar twinning are common in these plagioclase.

The mass of this monzonite is characterized not only by these conspicuous porphyritic microperthite, but also by those in the matrix of the rock. Thus, according to the degree of development of these perthite in the rock, rock facies locally or partially changes from monzonitic granite or quartz-monzonite to the quartz-syenite principally of microperthitic felspar with biotite or green amphibole and interstitial quartz. Near the contact with the hornfels exposed along the high way south of Ohama, the rock becomes siliceous; conspicuous myrmekitic quartz are formed in the peripheries of microperthitic crystals which interfere with neighbouring large quartz grains, and the perthitic felspar in this place does not grow so large as in the above-mentioned porphyritic monzonite. The oligoclase often graduates in its margin into perthitic felspar. Fluorite is found with sepia brown biotite[9], and the pleochroic haloes around zircon enclosures are remarkable in the biotite of the monzonite. At the very contact with the hornfels, the rock facies of the monzonite becomes fine grained; myrmekitic and micrographic textures are developed.

Under the microscope, these porphyritic microperthite are not homo-

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7) $\alpha_D=1.518$, $\beta_D=1.522$, $\gamma_D=1.525$.

8) $\gamma_D=1.666$-7, X=Cream yellow (28), Y=Old gold (36), Z=Harzel brown (54)*, $X \lessdot Y < Z$.

9) $\gamma_D=1.667$, X=Cream yellow (28), Y=Bronze (38), Z=Sepia (37)* $X \lessdot Y < Z$.

* These numbers are due to WADA's colour chert.

geneous single crystals; large twinned crystals are always composed of several individuals whose orientation are slightly different each other, and the septa between these individual grains consists of relic formed quartz and oligoclase, as shown diagramatically in Fig. 5. It is dangerous to interpret how the mineral grew, judging only from its textural relation observed in thin slices. These microperthite, however, seem to have been formed not at an earlier stage of consolidation of the rock as a phenocryst, but it might have been formed *in situ* at a later stage as a kind of porphyroblast, having included or replaced the earlier formed minerals such as oligoclase, quartz, etc.. If we consider the hypothetic constituents of this monzonite from which all of these perthitic felspar, or of the introduced material that might have converted earlier formed plagioclase to the present microperthite, are removed away, then the biotite-granite or biotite-quartz-diorite principally of oligoclase, quartz with biotite or with or without microcline may be reserved, and the hypothetic pre-existed rock may contain porphyritic large crystals of oligoclase. Postulate that into such hypothetic biotite-granite or biotite-quartz-diorite, alkaline solution capable of forming these perthite or of converting soda-lime felspar to these perthite were immersed *in situ*, the present quartz-monzonite might be formed. And according to the grade of 'alkali-zufuhr,' various rock facies as actually observed in the granitic rock might have appeared. Such a hypothesis of alkali-metasomatism will reasonably explain the petrogenesis of this igneous mass at least as one of the many alternatives. And this postulated pre-existed biotite-granite or biotite-quartz-diorite may be suggested by petrographic features of the remarkable xenoliths in the monzonite that are thought to have been derived from more basic rocks such as gabbro, diabase or diorite whose petrographic characters are quite similar to those of so-called basic xenoliths commonly found in granitic rocks.

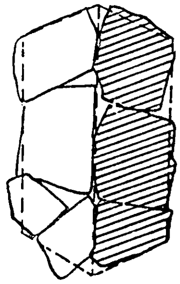

Fig. 5.
(×10)

(3) QUARTZ-SYENITE:

Quartz-syenite composed principally of perthitic felspar with biotite or amphibole and interstitial quartz is exposed areally in the vicinity of Oto and Isa. Boundary between this felspathic syenite and the monzonite could not be traced during his stay there.

Scanty mafic constituents are orange yellow biotite[10] and dull green

10) $\gamma_D=1.673$, X=Orange (51), Y=English Red (52), Z=Vndyke Brown (55).

Fig. 6. Microperthitic felspar forming the principal portion of the quartz-syenite exposed along the road side west of Isa. Microphoto., analyzer being inserted. (RM 47040359).

amphibole[11], and the latter intends to take the place of the former in the more felspathic portions. Both minerals often intimately associate with each other to form the clots among the perthitic felspar. Peripheral zone of these amphibole often graduate to the more bluish fringe of lower birefringence. The rock consists mainly of microperthitic felspar (Fig. 6). In this rock also, the large crystals of soda-lime felspar up to about 5mm in diametre are often found among the general mass of microperthitic felspar, 1–2mm in diametres. They usually indicate gradual zoning from sodic oligoclase in cores to albite further to microperthite in margin. In the larger crystals of these microperthitic felspar, central portion of the crystals are clear albite and graduates to microperthitic margin. The smaller crystals, in the other hand, consist essentially of microperthite. The textural relation between those two kinds of felspar is quite reciprocal, compared with the case of "rapakivi granite." As the minor constituents, sphene is most predominant, zircon, fluorite. calcite, iron ore, allanite are succeeding.

The fine grained facies of this felspathic rock are exposed along the road-side west of the tribe of Isa, where the dark bluish green inclusions of rounded or subangular shape are frequently found. They are various in their size, from microscopic dimension to megascopic up to several centimeters in diametres. These inclusions show, in general, the same mineral assemblage with that of the surrounding host rock, and are often considerably rich in coloured minerals. Some are rich in yellowish brown biotite[12], some contain considerable greenish amphibole, and there are also intermediate rock varieties. Detailed description and discussion on the origin of these inclusions will be mentioned in later pages. These inclusions, however, are the same in their origin as the xenoliths remarkedly found in the syenite exposed at the road-cutting between Oto and Isa (Fig. 3-4). Some of them might have been derived from the pre-existing volcanic

11) X=Old Gold (36), Y=Grape Green (161), Z=Dull Viridian Green (145), $c \wedge Z \fallingdotseq 20°$

12) $\gamma_D=1.664$, X=Ochraceous Salmon (44), Y, Z=Orange Rufous (45).

rocks and might have been affected by the host rock or by some agencies related to the host rock. And the original rock of these inclusions cannot be found in this vicinity. Blastoporphyritic dirty calcic plagioclase are commonly found in these inclusions. At the very contact with these inclusions, the syenite often changes sharply into aplitic film comparatively rich in quartz.

Through the microscopic observation on the quartz-monzonite and the quartz-syenite, general trend may be considered in the paragenic relation between coloured minerals and the felspathic constituents; sepia brown biotite are associated with the oligoclase in the monzonitic facies, orange yellow biotite with dull greenish amphibole are associated with the partially microperthitic felspar in which clear albite cores are still reserved. In the more felspathic rock composed principally of microperthite, greenish pyroxene appears.

(4) BASIC INCLUSIONS IN THE QUARTZ-MONZONITE:

One of the remarkable petrographic features of this igneous mass is the common occurrence of basic xenoliths as well as that of syenite. They are resembled in many respects to so-called basic inclusions commonly found in contaminated granitic rocks. The most representative type of this rock is exposed along the curved road 500 m west of Matsuo. The similar rock is also exposed at the seashore south of Isa. And the more melanocratic varieties are found as subangular xenoliths, about 50 cm or more in dia., in the porphyritic biotite-quartz-monzonite exposed at the road side 500 m south of Shirobae, western side of the peninsula. On these basic inclusions[13], it may be unnecessary to describe in detail here, for these rocks have been much debated by petrologists. The only thing to be discriminated from basic xenoliths in granite for these inclusions is the perthitic felspar permeating in these xenoliths. The blastoporphyritic calcic plagioclase are characteristic to these rocks (Fig. 7).

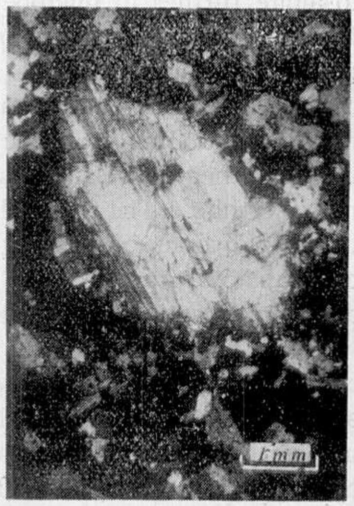

Fig. 7. Blastoporphyritic plagioclase in basic xenolith. Microphotographed analyzer being inserted. (RM 47040464)

(To be continued).

13) This ajective "basic" must be discussed from the petrogenetical standpoint. Here, it is conveniently used.