550.93 : 552.3(523.5) : 551.782

K-Ar Ages of Granitic Rocks of Ashizuri-misaki, Takatsukiyama and Omogo, Shikoku, Japan

By

Ken SHIBATA* and Tamotsu NOZAWA**

Abstract

K-Ar age of biotite (+ hornblende) from granite of Ashizuri-misaki, adamellite of Takatsukiyama and granodiorite of Omogo is 13±2, 12±2 and 14±2 m.y. respectively. All three ages are correlated to late Miocene or early Pliocene.

Geological setting

In the Outer Zone of Shikoku, there are exposed several small masses of granitic rocks. Except the old rocks along the Kurosegawa belt, these granitic rocks have similar petrographic characters, minerals, inclusions, type of intrusion, etc.

The Ashizuri granite in Ashizuri-misaki is composed of various facies such as gabbro, granodiorite, granite and associated dikes of rhyolitic and doleritic rocks. It is intruded into Ohama formation probably of Upper Cretaceous or Paleogene Tertiary, a member of Shimanto group (Fig. 2-a, Fig. 3-a).

The Takatsukiyama granite near Uwajima is famous for its abundant and peculiar inclusions. It is intruded into Torinosu series of Upper Jurassic, Nanyo group of Upper Cretaceous and Shimanto group of unknown age (Fig. 2-b, Fig. 3-b).

The Omogo granite lies in the midst of the Sambagawa metamorphic belt, accompanied by Tertiary sediments. It is composed of granodiorite, porphyritic granite and rhyolite. It is intruded into andesitic volcanic formation of Ishizuchi group, Miocene (Fig. 2-c, Fig. 3-c).

Description of the determined samples

(1) Fine-grained hornblende biotite granite (TN 62112501)

Ashizuri-misaki, Tosashimizu-shi, Kochi pref.

It is a fine-grained, homogeneous and relatively dark-colored granite with considerable amount of inclusions.

Under the microscope, it is mainly composed of hornblende, biotite, potassium feldspar, plagioclase and quartz, with small amount of iron ore, apatite and zircon. Hornblende is relatively small in amount and is allotriomorphic, 0.5~2.0 mm across, with pleochroism, X : pale brown, Y, Z : green. Biotite is smaller in amount than hornblende, always accompanied by hornblende, giving pleochroism X : nearly colorless, Y, Z : brown. Potassium feldspar predominates in amount, and is hypidiomor-

* Geochemistry & Technical Service Department
** Geology Department

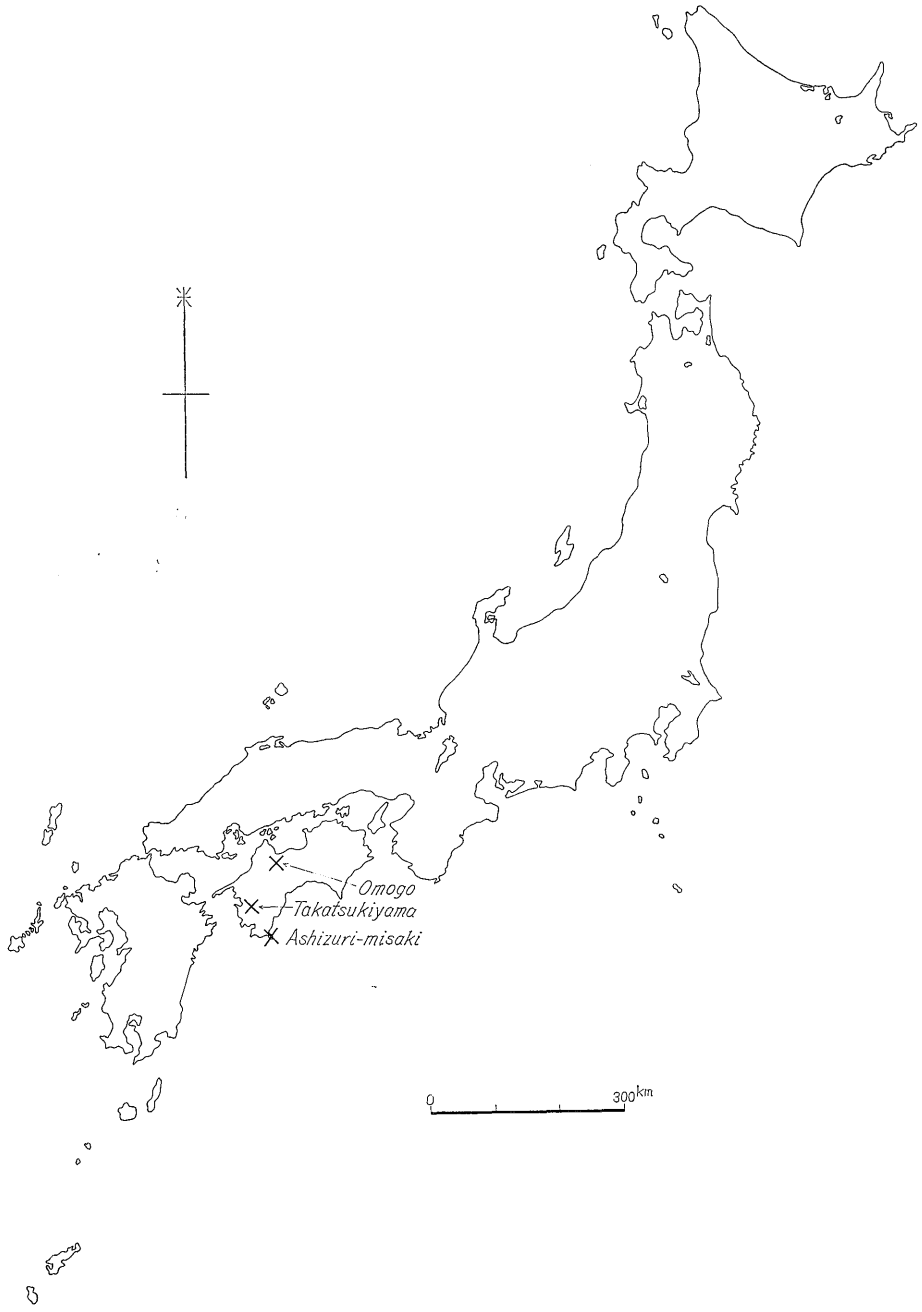
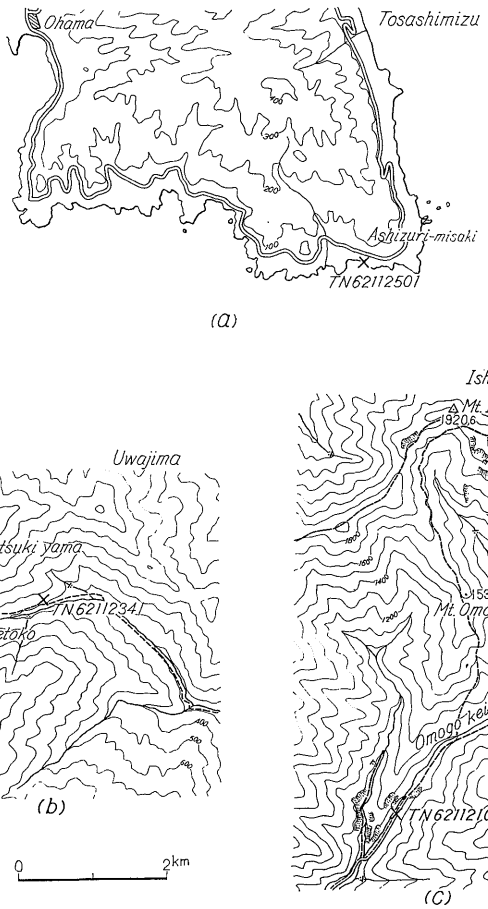


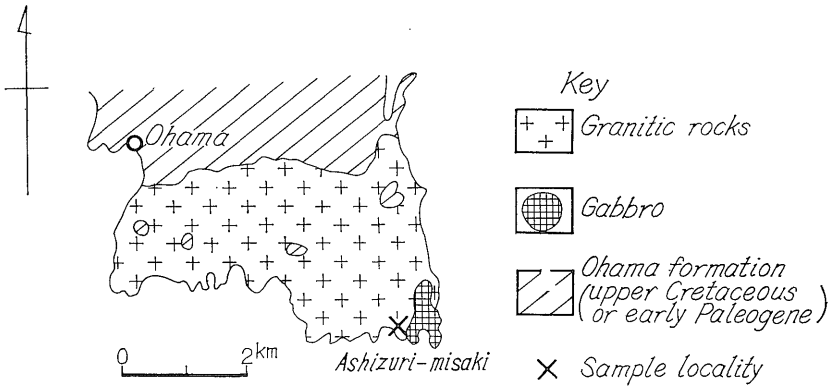
Figure 1 Index to Omogo, Uwajima and Ashizuri-misaki areas

phic, 1.0～3.0 mm across, with perthite veinlets. Plagioclase is relatively small in amount, hypidiomorphic, 0.01～0.10 mm across, nearly oligoclase in composition. Quartz is small in amount too, and is allotriomorphic, 0.2～1.0 mm across, with abundant cracks. Rarely hornblende includes diopsidic pyroxene in its core.



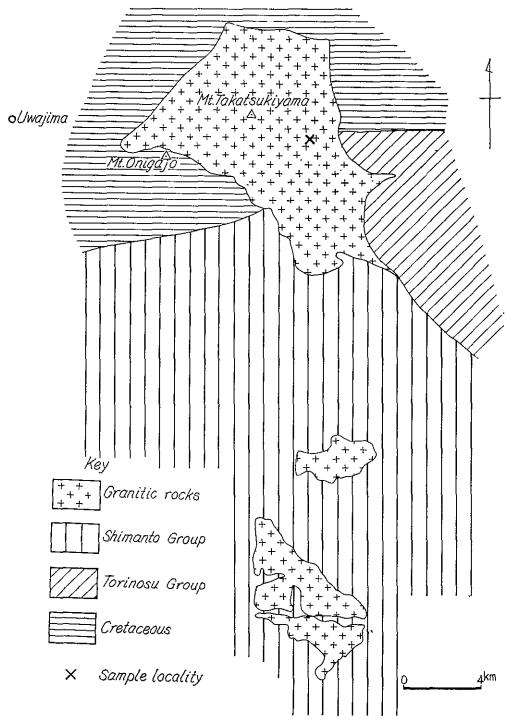
(a) Tosashimizu (b) Uwajima (c) Ishizuchiyama

Figure 2 Sample locality on the 1/50,000 topographic map



(a) Ashizuri-misaki area (after MURAKAMI & MATSUO, 1962)

Figure 3 Geological map



(b) Takatsukiyama area (after SUZUKI, 1936)

(2) Biotite adamellite (TN 62112341 B)
Takatsukiyama, Uwajima-shi, Ehime pref.

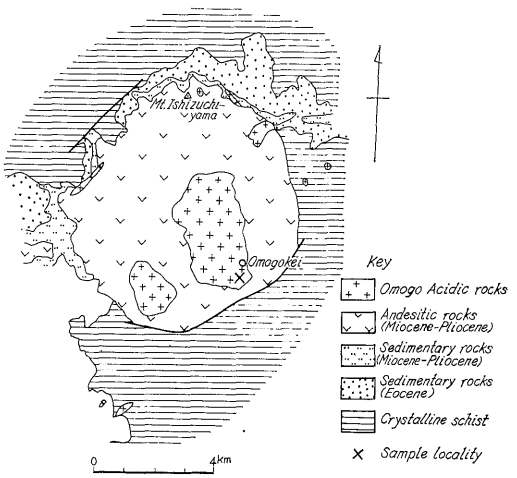
It is a medium-grained, light-colored, homogeneous adamellite with considerable amount of inclusions.

Under the microscope, it is composd of biotite, potassium feldspar, plagioclase and quartz with subordinate amount of iron ore, apatite, and zircon. Biotite is flaky, 0.5～1.0 mm across, with pleochroism, X : nearly colorless, Y, Z : reddish brown. Biotite often makes clot, in which biotite is liable to be chloritized. Potassium feldspar is relatively large, 3～7 mm across, often in porphyroblastic form. Intergrowth of potassium feldspar and quartz is sporadically found. Plagioclase is of short-prismatic idiomorph, 2～4 mm across, and is zoned and twinned polysynthetically. Plagioclase is about oligoclase in composition, quartz is interstitial, 2～4 mm across.

(3) Fine-grained biotite granodiorite (TN 62112105)
Omogokei, Omogo-mura, Kamiukiana-gun, Ehime pref.

It is a fine-grained, relatively dark-colored granodiorite, homogeneous despite of abundant inclusions.

Under the microscope, it is composed of biotite, plagioclase, quartz and potassium feldspar with subordinate amount of iron ore, apatite and zircon. Biotite is flaky, 0.2～0.3 mm across, chloritized to some extent, with pleochroism, X : nearly colorless, Y, Z : greenish brown. Biotite makes clot sporadically. Plagioclase is of long prismatic idiomorph, twinned, zoned, and is nearly basic oligoclase in composition. Potassium feldspar is relatively large, 1～2 mm across, prismatic and often twinned, and sometimes gets larger porphyroblastically, with flame-perthite. Quartz is allotriomorphic, 0.1～0.4 mm across



(c) Omogo area (after EHIMEKEN, 1962)

with abundant cracks.

Experimental procedure

Biotite and hornblende were isolated with an isodynamic separator after crushing and sieving of the rock sample.

Argon was extracted and purified in the pyrex high vacuum system. Each sample was fused in a molybdenum crucible at about 1300° C for 30 minutes with an induction heater. The Ar^{38} spike was added during fusion, and argon was purified from other gases with hot titanium sponge. Isotopic ratios of argon were measured by the static operation on the Mitsubishi MS-315G mass spectrometer, which is Reynolds-type with 15 cm-radius 60°-sector analyzer.

Potassium was determined by flame photometry. Each sample was digested with hydrofluoric acid and hydrochloric acid, and then, the residue was dissolved in hydrochloric acid, diluted to a standard volume, and the potassium content of the solution was measured with the Hitachi EPU-2 flame photometer.

The constants used in the calculations are : $\lambda_\beta = 4.72 \times 10^{-10}$ yr^{-1}, $\lambda_e = 0.584 \times 10^{-10}$ yr^{-1}, and $K^{40}/K = 0.0119\%$.

The results of the determination are given in the following table.

Table K-Ar ages of granitic rocks of Ashizuri-misaki, Takatsukiyama and Omogo

Sample No.	Mass	Mineral	K_2O (%)	Atmospheric contamination (%)	Age and error
(1) TN 62112501	Ashizuri	biotite and hornblende	2.56	57.4	13±2 m. y.
(2) TN 62112341 B	Takatsuki	biotite	7.29	18.2	16±1
(3) TN 62112105	Omogo	biotite	3.12	76.8	14±2

Geological meaning of the results

The ages, 13, 16 and 14 m. y. is quite similar to each other and are correlated to late Miocene or early Pliocene. No geological evidence is contradictory to the results. The Outer Zone granite of Southwest Japan is divided into two, after isotope chronology, one about 14 m. y. and the other about 20 m. y. The granitic rocks, Ashizuri, Takatsuki and Omogo, all belong to the younger group.

Literature

EHIMEKEN (1962) : *Geological map of Ehime prefecture and its explanatory text.* Ehime prefecture (in Japanese).

MURAKAMI, N. and MATSUO, H. (1963) : Petrological studies on the metasomatic syenites of the Cape of Ashizuri, Kochi prefecture. *Jour. Japan. Assoc.*

Min. Petr. Econ. Geol. vol. 50, no. 3, p. 93～109 (in Japanese with English abstract).

SUZUKI, T. (1936) : *Geological map of Japan*, 1/75,000, *Uwajima, and its explanatory text.* Geol. Surv. Japan (in Japanese with English abstract).

四国，足摺岬，高月山および面河の花崗岩類の K-Ar 年令

柴 田 賢・野 沢 保

要 旨

足摺岬の花崗岩の黒雲母・角閃石，高月山のアダメロ岩の黒雲母および面河の花崗閃緑岩の黒雲母は，それぞれ，13±2，12±2，および14±2 m.y. で，すべて，中新世末期に相当する。