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Potassium-Argon Ages of the Granitic Rocks from the Northern Kyūshū

By

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Potassium-argon age determinations were carried out on biotites separated from four granitic rocks of the northern Kyūshū.

Collection and description of the samples were made by Y. Karakida, and separation of biotites and K-Ar age analyses were made by K. Shibata. The analytical techniques were described by Shibata and Yamada.[1)]

The description of the samples is as follows.

Ud 10B Granodiorite

Locality : About 1 km southwest of Yodokawa, Nijo village, Itoshima-gun, Fukuoka prefecture.

Geology : A typical representative of the Itoshima granodiorite body. The Itoshima granodiorite is one of the earlier members in the successively-intruded granitic rocks of the northern Kyūshū. It intrudes concordantly to subconcordantly the Sangun metamorphic rocks.

Petrography : The rock is moderately coarse-grained and schistose. It consists mainly of plagioclase, quartz, potash feldspar, hornblende, and biotite with iron ore, apatite, sphene, zircon, and epidote as accessories.

It 1 and Nk 17B Granodiorite

Locality : It 1, Tsufunasaki, Fukuoka.

Nk 17B, On the western coast of Noko Island, Fukuoka.

Geology : Representatives of the western part of the Kitazaki granodiorite body. The Kitazaki granodiorite intrudes the Sangun metamorphic rocks at the southwestern half of the body, and the folded strata of the early Cretaceous age (Kwanmon group), which lies unconformably on the metamorphic rocks, at the northeastern half. It is unconformably overlain by the coal-bearing sediments of the Paleogene age.

Petrography : These rocks are moderately coarse-grained and schistose. Feldspar is purplish, being a diagnostic character distinguishing the Kitazaki granodiorite from other granitic rocks in the northern Kyūshū. Plagioclase, quartz, microcline, hornblende, and biotite are main constituents, and iron ore, sphene, apatite, zircon, epidote, chlorite, and tourmaline are minor constituents.

Ar 375 Adamellite

Locality : A quarry on the eastern slope of Mt. Katanawa, south of Fukuoka.

Geology : The rock belongs to the Sawara granite body. The Sawara granite intrudes the above two granodiorites and the metamorphic rocks. It is unconformably overlain by the coal-bearing sediments of the Paleogene age.

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Table 1 Results of K-Ar Age Determinations

Sample No.	Rock body	Rock	K_2O (%)	Atmospheric contamination (%)	Age and error (million years)
Ud 10B	Itoshima	granodiorite	5.64	17.0	97± 6
It 1	Kitazaki	granodiorite	6.27	10.3	90± 8
				8.9	89± 7
Nk 17B	Kitazaki	granodiorite	5.48	17.4	97±10
Ar 375	Sawara	adamellite	8.42	14.3	83± 7

$\lambda\beta=4.72\times10^{-10}$ yr^{-1}, $\lambda_\varepsilon=0.584\times10^{-10}$ yr^{-1}

Petrography: The rock is moderately coarse-grained, porphyritic and massive, but partly has a linear structure. Porphyritic potash feldspar, existing in varying amounts and sizes is poikilitic and colored pale pink in some places. It consists mainly of plagioclase, quartz, potash feldspar, and biotite with muscovite, iron ore, and monazite as accessories.

The results are given in Table 1. The ages range from 83 to 97 m. y., indicate the late Cretaceous age for the intrusion of the granitic rocks, and are consistent with the geological evidence.

If the average age of 94 m. y. is taken for the Kitazaki granodiorite, this is considered to be of the same age as the Itoshima granodiorite, whereas the age of the Sawara granite (Ar 375) seems to be slightly lower than those of the above-mentioned granodiorites. This is also consistent with the field evidence that the Sawara granite intrudes these two granodiorites.

Recently, Karakida and Gottfried[2] made the age determinations by the Pb-α method on zircon and monazite from the granitic rocks of this area, and obtained the age of 110±10 m. y. (zircon) for the Itoshima granodiorite, 115±15 m. y. (zircon) for the Kitazaki granodiorite, and 90±10 m. y. (zircon), 94±10 m.y. and 90±10 m. y. (monazite) for the Sawara granite. These ages are slightly higher than those obtained by the present K-Ar method. This might be explained by argon loss from the biotites. However, if the limit of experimental error is taken into consideration, the differences in ages between two methods probably have little significance.

The general agreement of the K-Ar age and the Pb-α age further suggests, therefore, that the intrusion of the granitic rocks in the northern Kyūshū took place in the middle to late Cretaceous age.

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References

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北九州花崗岩類の K-Ar 年代

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要　旨

北九州産の4個の花崗質岩石から分離した黒雲母について，K-Ar 法による年代測定を行なった。糸島花崗閃緑岩（Ud 10B）は 97×10^6 年，北崎花崗閃緑岩（It 1, Nk 17B）は 90×10^6 年，97×10^6 年，早良花崗岩（Ar 375）は 83×10^6 年の値が得られた。

これらの年代は，花崗岩類が後期白亜紀に迸入したことを示し，地質学的事実と矛盾しない。