Chromian Muscovite from Taiwan (Formosa)

by

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It has long been known that some chromian muscovites occur in the crystalline limestones outcropping along the Takkirichi, eastern Taiwan; ICHIMURA (1934; 1936a, b), KONO (1934), and KONO and YAMASHITA (1936) have already reported the optic properties and chemical composition of the chromian muscovites. During the geologic survey in the metamorphic terrain of the Central Range of Taiwan, one of the writers also has found some chromian muscovites at several places except for the Takkirichi. The purpose of this note is to present the mode of occurrence, optic properties, and chemical compositions of the chromian muscovites from Taiwan.

1. The chromian muscovite in the crystalline limestone of the Takkirichi

According to ICHIMURA (1936a, b), there are two main localities of chromian muscovites in the Takkirichi; one is near Shiguretaki between Ayo and Chipan, and the other is Raushi between Houliu and Chuilu. The chromian muscovite at Shiguretaki occurs in the crystalline limestone close to the Takkirichi gneiss body (paragneiss and migmatite), forming small aggregates or flakes among the calcite grains. Pyrite, siderite, quartz, and limonite are the associated impurities. The chromian muscovite at Raushi, according to ICHIMURA (1934), is also found to occur, with pyrite, rutile, and iron oxides, among the calcite grains of the crystalline limestone which is interlayered by a chlorite schist.

(a) The chromian muscovite collected from Tuankai, Raushi shows (ICHIMURA, 1934): light greenish blue color, cleavage $//(001)$ distinct, straight extinction, $X//c$, $\alpha' = 1.559$, $\gamma' = 1.592$, $\gamma' - \alpha' = 0.033$, $(-)2E \approx 60^\circ$.

Table 1. Optic properties and chemical composition of the chromian muscovite from Raushi (KONO and YAMASHITA, 1936).

SiO ₂	45.83	Metal atoms on the anhydrous basis of O=22.		$\alpha' = 1.560$
TiO ₂	0.57			$\gamma' = 1.595$
Al ₂ O ₃	34.05			$\gamma' - \alpha' = 0.035$
Cr ₂ O ₃	0.23			$(-)2E \approx 60^\circ$
Fe ₂ O ₃	—	Si	6.280	X -light greenish blue
FeO	—	Ti	0.057	
MnO	—	Al	5.475	
MgO	1.34	Cr	0.016	Y- "
CaO	—	Mg	0.271	Z- "
Na ₂ O	1.52	Na	0.395	
K ₂ O	6.43	K	1.118	
Li ₂ O	0.21	Li	0.115	
H ₂ O+	8.94			
CO ₂	—			
F	—			
V ₂ O ₅	0.15			
P ₂ O ₅	—			
Total	99.27

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(b) The chromian muscovite collected from Raushi, according to KONO and YAMASHITA (1936), has the following optic properties and chemical composition (Table 1).

2. The chromian muscovite in quartz veinlets cutting a crystalline limestone boulder contained in the albite-spotted graphite-quartz schist of Mataian

A crystalline limestone boulder cut by chromian muscovite-bearing quartz veinlets was found in the sericite-graphite-quartz schist in the mouth of the Mataianchi (YEN and YANG, 1954). The chromian muscovite here is commonly $0.2 \times 0.2 \times 0.5$ mm. in size and shows: $(-)$ 2V medium, X-pale greenish blue, Y-yellowish green, Z-yellowish green, absorption $X < Y \approx Z$.

3. The chromian muscovite in the mica-amphibole schist of Zuishui, Hualien

The chromian muscovite at Zuishui forms a principal constituent mineral of the mica-amphibole schist which is intercalated in the albite-spotted graphite-quartz schist. The modal composition of the mica-amphibole schist is as follows (volume): chromian muscovite (including a small amount of undetermined tiny minerals) 47%, amphibole 52%, albite 0.5% and quartz and others 0.5%. The

Table 2. Optic properties and chemical composition of the chromian muscovite from Zuishui.

SiO ₂	49.82	Metal atoms on the	$\alpha = 1.562$ (calc.)
TiO ₂	0.22	anhydrous basis of	$\beta = 1.593$
Al ₂ O ₃	28.14	O = 22.	$\gamma = 1.599$
Cr ₂ O ₃	0.19	Si 6.603	$\gamma - \alpha = 0.037$
Fe ₂ O ₃	1.02	Ti 0.023	$(-)$ 2V = $38^\circ \pm 1^\circ$
FeO	1.08	Al 4.334	Dispersion weak: $r > v$
MnO	0.03	Cr 0.016	In thick section:
MgO	4.20	Fe''' 0.095	X-colorless
CaO	2.42	Fe'' 0.118	Y-pale yellowish green
Na ₂ O	3.59	Mn —	Z-bluish green
K ₂ O	6.33	Mg 0.827	In thin section:
H ₂ O +	2.46	Ca 0.339	X, Y, Z-colorless
H ₂ O -	0.41	Na 0.914	Absorption: $X < Y < Z$.
P ₂ O ₅	tr	K 1.056	
Total	99.91

Table 3. Optic properties and chemical composition of the amphibole from Zuishui.

SiO ₂	50.94	Metal atoms on the	$\alpha = 1.617$
TiO ₂	0.30	anhydrous basis of	$\beta = 1.622$
Al ₂ O ₃	15.42	O = 23.	$\gamma = 1.637$
Cr ₂ O ₃	0.15	Si 7.013	$\gamma - \alpha = 0.020$
Fe ₂ O ₃	3.45	Ti 0.033	$(-)$ 2V = $71^\circ \pm 5^\circ$
FeO	2.14	Al 2.495	Z $\wedge$ c 15°
MnO	0.14	Cr 0.017	Colorless or very pale
MgO	13.31	Fe''' 0.346	greenish blue.
CaO	9.07	Fe'' 0.248	
Na ₂ O	1.36	Mn 0.008	
K ₂ O	0.92	Mg 2.751	
H ₂ O +	2.40	Ca 1.338	
H ₂ O -	0.33	Na 0.363	
P ₂ O ₅	tr	K 0.165	
Total	99.93

$$\text{Fe}'''/\text{R}''' = 0.18$$

$$\text{Fe}''/\text{R}'' = 0.08$$

chromian muscovite crystals, commonly having 5 mm. in diameter, show the following optic properties and chemical composition (Table 2).

As inferred from the chemical composition, the chromian muscovite under consideration may be identified as chromian picropengite.

The amphibole accompanying the chromian muscovite has the following optic properties and chemical composition (Table 3).

From the chemical composition it is inferred that the amphibole here concerned is a glaucophanic one which has more Ca content than glaucophane.

4. The chromian muscovites at other localities

Several small chromian muscovites crystals have ever been detected in the sericite-graphite-quartz schist at Chinan, Hualien. Moreover, some chromian muscovite crystals occur in the chlorite schist which is intercalated in the sericite-graphite-quartz schist in the Mohenchi, Nanao.

All the chromian muscovites of eastern Taiwan are found in the late Paleozoic metamorphic rocks outcropping on the eastern slope of the Central Range. The grade of the metamorphism in the areas where the chromian muscovites occur corresponds principally to the muscovite-chlorite subfacies and partly to the biotite-chlorite subfacies of the greenschist facies.

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台湾の含クローム白雲母

顔 滄 波・顔 滄 濤

(摘 要)

台湾中央山脉東斜面の変成岩地域のあちこちから含クローム白雲母を産する。その産状に、結晶石灰岩中に産するもの、石英細脈中に出るもの、雲母角閃片岩の一成分を構成するもの、絹雲母石墨石英片岩中に出るもの、及び緑泥片岩中に産するもの等がある。それら含クローム白雲母を産する地域の 変成度は大部分が緑色片岩相の白雲母・緑泥石亜相に相当し、一小部分が黒雲母・緑泥石亜相に入る。