

## **On the Chemical Compositions of the Eruptives of Volcanoes in New Britain, Pacific Ocean.**

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We have carried out the chemical analysis of lava, lapilli and volcanic sand ejected from the volcano group near the city of Rabaul in New Britain (Bismarck Archipelago).

These volcanoes are Mt. Tavurvur, Mt. Kombiu and Mt. Baluan. Samples for the chemical analysis were collected by Mr. Kizawa, a seismologist of the Central Meteorological Observatory of Japan, in 1942.

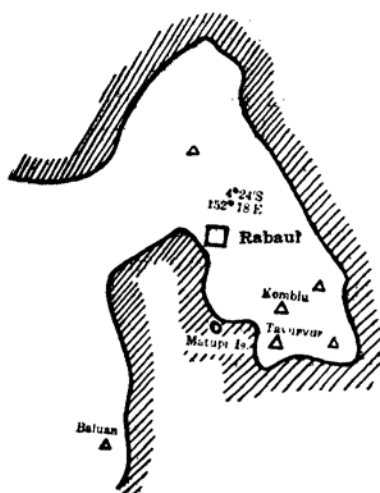


Fig. 1. The volcano group near the city of Rabaul

The present conditions of these volcanoes are as follows. Mt. Tavurvur exploded in 1937, and its volcanic activity has continued until the present day. Mt. Baluan erupted after the explosion of Mt. Tavurvur in 1937, but it is in dormant state now. Mt. Kombiu has two craters. The old one is called Rabalankaia which has been dormant since 1870, and the other is Palagiagia which was active till recent days.

The chemical compositions of the following seven samples have been studied.

Table 1.

No.	Name of Mountain.	Kind.	Colour, etc.	Place of Collection.
1.	Mt. Tavurvur.	Lapilli.	Blackish violet, pumiceous.	East side.
2.	do.	Sand	Pale reddish brown.	do.
3.	do.	Lapilli.	Like No. 1.	Top
4.	Mt. Baluan.	Lapilli.	Black.	do.
5.	Mt. Kombiu. (Rabalankaia)	Lapilli.	Black.	Wall of the crater.
6.	do.	Lava sand.	Blackish blue.	Bottom of the crater.
7.	do. (Palagiagia)	Lava.	Black.	Unknown.

In Table 2 and Table 3, the results of chemical analysis are given.

Table 2.

Chemical Compositions of the Eruptives from Mt. Tavurvur.

	No. 1.	No. 2.	No. 3.	Mean.
Si O <sub>2</sub>	48.47 %	46.65 %	48.34 %	47.82 %
Ti O <sub>2</sub>	0.77	1.17	0.85	0.93
Al <sub>2</sub> O <sub>3</sub>	18.81	20.11	17.75	18.89
Fe <sub>2</sub> O <sub>3</sub>	3.70	4.49	4.64	4.28
Fe O	6.39	5.96	6.73	6.36
Mn O	0.19	0.28	0.23	0.23
Mg O	5.68	5.33	5.35	5.45
Ca O	12.75	11.40	11.96	12.04
Na <sub>2</sub> O	1.94	2.19	3.19	2.44
K <sub>2</sub> O	0.53	0.64	0.49	0.55
P <sub>2</sub> O <sub>5</sub>	0.25	0.31	0.75	0.44
H <sub>2</sub> O <sup>+</sup>	—	0.01	—	—
H <sub>2</sub> O <sup>-</sup>	0.23	0.50	0.17	0.30
Total.	99.71	99.04	100.45	99.73

Table 3.  
Chemical Compositions of the Eruptives from  
Mt. Baluan and Mt. Kombiu.

	No. 4.	No. 5. & No. 6.	Mt. Baluan		
	No. 7.		Mt. Kombiu (Rabalankaia)		
	No. 4	No. 5.	No. 6.	No. 7	Mean.
Si O <sub>2</sub>	61.75 %	59.75 %	60.80 %	59.40 %	60.42 %
Ti O <sub>2</sub>	1.08	0.87	0.95	0.90	0.95
Al <sub>2</sub> O <sub>3</sub>	14.44	14.00	15.50	14.81	14.69
Fe <sub>2</sub> O <sub>3</sub>	3.05	2.06	2.51	3.30	2.73
Fe O	3.67	5.01	3.57	3.93	4.05
Mn O	0.12	0.09	0.14	0.15	0.13
Mg O	1.52	2.61	1.62	2.12	1.97
Ca O	7.53	9.16	8.01	9.61	8.58
Na <sub>2</sub> O	3.55	3.98	3.48	3.27	3.57
K <sub>2</sub> O	1.88	1.91	1.82	2.33	1.99
P <sub>2</sub> O <sub>5</sub>	0.73	0.54	1.00	0.95	0.81
H <sub>2</sub> O <sup>+</sup>	0.05	0.21	0.29	0.11	0.17
H <sub>2</sub> O <sup>-</sup>	0.08	0.07	0.27	0.02	0.11
Total	99.45	100.26	99.93	100.90	100.17

From these results we can find a good similarity among the composition of three samples collected on Mt. Tavurvur. In the other hand, eruptives from Mt. Baluan and Mt. Kombiu have almost the same composition which distinctly differs from those of the eruptives from Mt. Tavurvur. Eruptives from Mt. Tavurvur have low silicic acid content (smaller than 50%) and contain more aluminium, iron, manganese, calcium and magnesium, and less alkalis than those from the other two volcanoes, therefore, they may be called basaltic. On the contrary, eruptives from Mt. Baluan and Mt. Kombiu have comparatively high silicic acid content (almost 60%), and they are quartz-andesitic.

There are old data of chemical analysis of lava and pumice in New Britain by A. Liversidge<sup>(1)</sup> (1883), which are fairly different from our results. But, as H. S. Washington pointed out, the content of magnesium is too small and manganese is too high in his data and these are not probable. It is of interest to compare the chemical compositions of the eruptives of volcanoes in New Britain with the eruptives of famous volcanoes in Japan. Mean values of those of Mt. Tavurvur and Mt. Kombiu and other data of eruptives in Japan are given in Table 4.

(1) H. S. Washington, "Chemical Analysis of Igneous Rocks," p. 250, 429 Washington, D. C. (1903).

Table 4.

	Tavúrvur	Kombiu	Aso <sup>(2)</sup>	Fuji <sup>(3)</sup>	Fuji <sup>(4)</sup>
Si O <sub>2</sub>	47.82 %	60.42 %	53.92 %	49.31 %	57.87 %
Ti O <sub>2</sub>	0.93	0.95	0.85	0.60	0.82
Al <sub>2</sub> O <sub>3</sub>	18.89	14.69	18.67	19.86	17.80
Fe <sub>2</sub> O <sub>3</sub>	4.28	2.73	2.69	3.93	3.07
Fe O	6.86	4.05	5.93	6.43	5.31
Mn O	0.23	0.13	0.14	0.22	0.20
Mg O	5.45	1.97	3.80	5.11	2.63
Ca O	12.04	8.58	9.27	11.03	6.80
Na <sub>2</sub> O	2.44	3.57	2.90	1.97	3.52
K <sub>2</sub> O	0.55	1.99	1.86	0.60	1.43
P <sub>2</sub> O <sub>5</sub>	0.44	0.81	0.27	0.16	0.27
H <sub>2</sub> O <sup>+</sup>	—	0.17	0.21	0.51	0.91
H <sub>2</sub> O <sup>-</sup>	0.30	0.11	—	—	—
Total	99.73	100.17	100.51	99.73	100.63

In this Table we can see the resemblance between the chemical compositions of the eruptives of the volcano group near the city of Rabaul and those of Mt. Fuji.

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(2) Y. Miyake and K. Mayama, *J. Met. Soc. Jap.* Ser. II. **16** (1938), 95.

(3) I. Iwasaki, *J. Chem. Soc. Jap.*, **58** (1937), 487.

(4) I. Iwasaki and M. Ikawa, *ibid.*, **59** (1938), 1175.