NEW ZEALAND EXHIBITION, 1865.

REPORTS AND AWARDS

OF

THE JURORS.

AND

APPENDIX.

DUNEDIN:
PRINTED FOR THE COMMISSIONERS
BY MILLS, DICK & CO., STAFFORD STREET.
MDCCCLXVI.

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Queen Island guano would require a little more, from its greater admixture with carbonate of lime.

It may be mentioned that these guanos are especially adapted for the employment of this process, by their comparative freedom from carbonate of lime.

In the appended analyses the "soluble salts" are principally composed of chlorides of sodium and sulphates of soda and lime.

Analyses.

	Coral Queen Island.	Bird Island, Tasmania.
Phosphate of lime	74.20	74.98
Phosphates of magnesia and alumina	traces	traces
Carbonate of lime with a little carbonate of magnesia	8.90	traces
Soluble phosphates	traces	.30
Organic matter	7.20	14.60
Soluble salts (not phosphates)	1.40	.90
Water	7.20	8.50
Silicious substances	1.10	.72
	100.	100.

From a comparison of these columns it will be observed that the guano from Tasmania has a slight advantage over the other in having organic matter substituted for carbonate of lime, and an estimable quantity of its phosphate being already in an available form for the use of plants.

It is most probable that this difference of constitution is owing to the guano from Coral Queen Island having been more exposed to rain-fall, but it must not be overlooked that this deposit may have been unfairly sampled from the outside, which will of course be more wasted and decomposed than the interior portions, so that when properly worked as the other deposit has been, an equally good result may be obtained.

These guanos are coming more into request, especially for certain root crops, than the more nitrogenous varieties, for, though not so stimulating, they are more permanent in their action, and yield those compounds to the growing plant which constant cropping is the most likely to remove.

TARANAKITE,

A new Phosphatic mineral, Taranaki, presented by H. Richmond, Esq.

This singular mineral was mistaken for *Wavellite*, to which indeed chemically it is very nearly allied, but its physical properties are quite distinct therefrom, as unlike *wavellite* it is fusible in the blow-pipe flame and with great ease. Its hardness is also considerably less, and it is also amorphous.

It was this difference which determined the performance of a quantitative analysis of the specimen, as the other indications obtained by qualitative analysis were precisely such as would have been looked for had the mineral really been *wavellite*.

As was surmised from its fusibility, the results gave a higher ratio of phosphoric acid to the alumina than occurs in that mineral, and there was found besides a certain proportion of potash which there is every reason to believe forms a definite part of the mineral as separated from what is accidental or foreign to it.

Chemically, therefore, the appended analysis will indicate it to be essentially a double hydrous phosphate of alumina and potash, part of the alumina being replaced by sesqui-oxide of iron. On account of these characters it has been considered to be an undescribed mineral, and named after the locality where it is found.

On careful examination a few thin seams of a dark yellowish brown colored substance, hard, translucent, and infusible, could be discovered traversing the mineral in various directions, and this was found to be true *wavellite*. In selecting the sample for analysis, these seams were however carefully avoided.

This mineral is said to occur in thin seams which occupy fissures in the trachytic rocks that form the Sugar Loaves at Taranaki, and if it could be obtained in quantity at a reasonable expense, it would be valuable as a source of phosphoric acid for agricultural purposes; for there is no reason why the addition of sulphuric acid in proper proportion should not produce equally as good a super-phosphate from this mineral as is obtained from burnt bones by similar treatment, at least for calcareous soils. One advantage in thus substituting this mineral would be that a smaller quantity of acid would suffice to effect the decomposition, both on account of the equivalent of alumina being lower than that of lime, and also because of the entire absence of carbonates in this new phosphatic earth.

Analyses.

		I.	II.
Phosphoric acid		35.05	22.80
Alumina		21.43	—
Iron, protoxide		4.45	—
Lime		.55	—
Potash		4.20	—
Soda		traces	—
Chlorine		.46	—
Sulphuric acid		traces	—
Insoluble in acid (silica)		.80	·60
Water driven off at 212°,	15.46	33.06	35·80
„ „ red heat	17·60		

Absence of ammonia and organic matter; has slight acid reaction.

Assuming deposits having the nature of guano to be the most natural source from which this phosphate might be derived, especially in the case of such a mineral as this, which is found occupying fissures in the most recent volcanic rocks of the country, and on the sea coast, and therefore must be of extremely late origin, we are required to discover in what manner and by what agencies the lime of the original deposit has been removed and alumina substituted, so as to present us with a mineral similar in its essential constituents to the one under discussion.

The very large percentage of water present would appear to indicate that this has been effected by chemical interchange in the moist way, as we have not the slightest proof that anhydrous phosphates of these kinds pass into hydrous forms.

Relative to the form in which the alumina is offered to the phosphate of lime, it would appear according to Professor Bischof, that it must be some other than that of a silicate, for in page 33, vol. 2, of his work on "*Chemical and Physical Geology*," he states,—"My experiments also show that it is impossible for *wavellite* to have been formed by the mutual decomposition of silicate of alumina and phosphate of lime in solution." And the same remark will apply to *taranakite*.

Now the only other probable form in which alumina in quantity would be presented to the original phosphate, is that of the sulphate or double sulphate of alumina and potash, or soda. The comparative infrequency of the pyritous shales, or schists, which by their decomposition furnish these aluminous sulphates, and the still greater infrequency of their juxta-position with phosphatic matters, or at least their proximity thereto, is in accordance with the rarity of the metamorphosis under consideration.

It therefore became an interesting question whether or not phosphate of lime was capable of entering into double decomposition with an aqueous solution of aluminous sulphates. In order to discover this, a weak solution of alum was applied to some of the coarsely pounded phosphatic guano from Auckland, already described; after the lapse of a few minutes, the guano presented a gelatinous appearance, and it recovered some portion of its former coherence. After a period of 48 hours, the solution lost the acidity indicating the presence of alum, and when filtered and tested, gave the reaction of lime, sulphuric acid, and potash only.

This result would seem to prove incontestably that the whole of the alumina in a solution of alum can be abstracted therefrom by the phosphoric acid in guano, to make with it a hydrous phosphate; and we may safely infer that with a sufficiency of alum and time being allowed, the proportion of lime in the modified phosphate could be reduced to that indicated in the analysis of this mineral already given.

SULPHUR.

Sulphur, in yellow and slightly lustrous masses of great purity, was exhibited largely from both White Island and certain islands in the Bay of Plenty; and it is reported to exist in the former locality in large quantity, and in situations favorable for its extraction and shipment.

From the serious objections to the shipment of sulphuric acid, and the consequently high rate of freight upon it, the value of any large sulphur deposit is very much enhanced, as, with the advance of manufacturing industry, a large demand will arise in the Australian Colonies for this important and essential agent.

It is very satisfactory to know that, when desirable, we have the manufacture of sulphuric acid. with all its allied advantages, in our possession; but what is more important, and which may be even of vital interest to us, is the circumstance that in sulphur we have that constituent of gunpowder which is the most difficult to obtain. The other component parts of gunpowder are much more easily procured, as the charcoal can without doubt be produced equally good for the purpose as that used at home from some of the native woods, and we have all the necessary substances for the manufacture of saltpetre.

BITUMEN.

Only two substances containing this mineral were exhibited; one, from the coast of the North Island, was a specimen of excellent Bitumen, easily impressed by the nail, and perfectly free from impurities. This is a very useful mineral, but as we have no information as to the abundance in which it is found, any further remarks are unnecessary. If this sample was found on the sea coast, there is a probability that it has been merely lost by some ship.

The second was a Bituminous Shale from the Bush Reserve, Kaikorai, Otago, and was a dull earthy friable shale of a brown color;—upon exposure, cracking considerably, but not readily fatting, and burning with difficulty, leaving a very large amount of light red ash. The coke is of a dull lead color, and imperfectly formed. As the sample arrived in a very wet state, it was allowed to remain exposed to the air in a state of powder until its weight was constant. This shale is characterised by its high percentage of volatile substances.