THE

RURAL CAROLINIAN;

AN

ILLUSTRATED MAGAZINE,

OF

Agriculture, Horticulture and the Arts.

D. H. JACQUES, EDITOR.

Progress with Prudence, Practice with Science.

VOL. I.

CHARLESTON, S. C.:
WALKER, EVANS & COGSWELL AND P. WYATT AIKEN,
NOS. 3 BROAD AND 109 EAST BAY STREETS,
1870.

sufficient size, combined with the necessary mineral ingredients required to perfect the seed. The lint being only an appendage of the seed, it follows that there must be food enough to mature the seed before we can secure the lint. This is the main fact; but we can also take advantage of the laws which govern variation in plants, and, by repeated and careful selection, obtain a variety which will give this appendage in greater quantity or of longer and finer texture. This subject is merey alluded to in illustration of what has been said before. It is of great significance, and deserves more attention than we can now devote to it. R.

Notice of the Guanape Island Guano.

This variety of Peruvian guano has the present season, for the first time, made its appearance in Charleston. The ship Elliott Ritchie, (formerly the Harriet Lane, of the United States Navy,) loaded with this commodity, having on her way to Baltimore been disabled off Hatteras, was compelled to put back to this port, where her cargo has been discharged and sold. An opportunity was thus afforded me by her consignees, Messrs. G. W. Williams & Co., to examine the cargo.

A similar occurrence enabled me fifteen years ago to inspect the first cargo of the stony phosphate of Mong's Island, in the Caribbean Sea, when a vessel also on its way to Baltimore, was forced to stop here and discharge for repairs. I then analyzed and described (in *Silliman's American Journal of Science*) this species, under the name of Pyroclasite, as a substance unknown to science. This name was applied from its property of flying to pieces when strongly heated. The nodular phosphates of South Carolina, for the most part, belong to the same species; though they are rarely as rich in phosphate of lime as the mineral from the Musquito coast.

Guanape is a small island, scarcely two miles in diameter, but with an elevation of over one thousand feet above the sea, situated upwards of 400 miles to the northeast of the Chincha Islands, in lat. 8° 25′ S., and long. 79° 25′ W. Many thousand Coolies are there employed, under agents of the Peruvian Government, in digging and loading the guano; and, already, hundreds of ships find constant employment in its transportation to various quarters of the globe. Charleston will take a deeper interest in this production, as it is understood that arrangements are in view for its shipment direct to this port. Should this come to pass, it will form very largely the ammoniacal constituent of our artificial fertilizers; as nothing could be better adapted to the purpose, when employed as a mixture with the South Carolina Phosphates, in the ratio of one part of the former to three of the latter.

The present cargo consisted of about 900 tons, and was quite uniform in its character. Two commercial analyses, made from different parts of the cargo, by Prof. Charles U. Shepard, Jr., State Inspector of Fertilizers, gave the following results:

No. 8, 2

	(1.)	(2.)
Water	27.75	23.10
Organic Matter	35.48	38.53
Ammonia, (N. H.^{3})	10.08	10.22
Phosphoric Acid	14.80	16.13
Bone Phosphate of Lime	32.31	35.21
Sand	1.53	1.46

It hence appears that the Guanape guano does not differ essentially from that of the Chincha group generally.

Without carrying farther the comparison between the Guanape and the Chincha productions, I proceed to state a few chemical and mineralogical observations I have been able to make upon the present cargo.

The efflux of ammoniacal fumes is pungent on exposure to the air. The ammonia, however, does not chiefly proceed from the spontaneous decomposition of the already-formed carbonate of ammonia, or from nitrogenized compounds, (guanine, guanadine, uric acid, etc., which form a large part of the guano,) but largely from the phosphate of ammonia, whereby this salt becomes a biphosphate, and also from certain double salts, into whose composition the sulphate of ammonia enters.

An aqueous solution of the guano reäcts as an acid, partly from oxalic acid, and partly from the presence of biphosphate of ammonia; so that the solution froths for some time, like freshly-opened ale or porter; after which it is neutral to test-paper.

One of the most interesting crystalline minerals found in this guano has not before attracted attention. It occurs in irregular balls and veins, often an inch or more in thickness, having somewhat the appearance of the red Cheshire rock-salt, with this difference, that the cleavage (which is easy) is not cubical, but rhombic. Its hardness is between that of salt and talc. Specific gravity, 2.3. It requires between four and five parts of water at 60° F. for solution. Taste bitter and saline. It is composed of

Sulphate of Potash	67.75
Sulphate of Ammonia	27.88
Oxalate of Ammonia	3.75
	99.38

It loses ammonia slightly on exposure to the air, and becomes of a lighter color. Heated to redness, it evolves the sulphate of ammonia, accompanied by other changes, leaving a residue of about 70 per cent. of a slightly acid sulphate of potash. I have named the substance *Guanapite*, from its locality.

Another equally curious and novel substance was found, in a few examples only, in the cargo, as a pseudomorph of a bird's egg, having the size and shape of that of the domestic duck. They are called fossil eggs at the island. Exteriorly, they are white; and seem to retain portions of the original shell; but these, when scaled off and tested, seemed to be a mixture of the oxalate and phosphate of lime. Within, the substance is foliated, easily cleavable, with

a rhombic cleavage. Color, cream-white; lustre, somewhat pearly; feebly translucent; hardness, below that of salt; specific gravity, 1.58. When heated, swells up, turns black at first, partially fuses, giving off copious fumes of ammonia, and leaving a white residue of sulphate of potash. It is composed of

Sulphate of Potash	40.20
Oxalate of Ammonia	29.57
Water	30.46
	100.23

This substance may be called *Guanoxalite*, in allusion to its composition.

Where remains of bird skeletons exist in the guano, we find, especially in the cavities of the spinal column, the cranium and the stomach, another compound, in yellow crystals, which retain their color and lustre in the air. It is, also, composed of the sulphates of potash and ammonia; but in different proportions from the Guanapite above described. It was first noticed in guano from the Chincha's; and named Taylorite, by Prof. Dana, after its discoverer.

In connexion with the Taylorite occur, rather abundantly, minute, transparent scaly crystals of pure sulphate of potash, (Aphthitalite.) Also, oxalate of ammonia in very delicate but perfect crystals, which, as it has not been recognized before as a natural substance, may receive the name of *Oxammite.*

The shrivelled skins and intestinal membranes are likewise coated, occasionally, with crystalline masses of stercorite, (the double phosphate of soda and ammonia.) Crystals of oxalate of lime (oxacalcite) are very rarely recognized, attached by a point to thin shreds of animal membrane.

The bony remains of birds and seals, on exposure to the air, become rapidly coated with stellar groups of crystals of phosphate of ammonia, (Phosphammite,) and these, by longer exposure to the atmosphere, effloresce and become acid from the loss of ammonia, thereby giving rise to the biphosphate of ammonia (*Biphosphammite.*)

In addition to the foregoing salts, considerable lumps of almost transparent phosphammite occur among this guano. These, on exposure, diffuse ammonia, and have their surfaces coated by a white, powdery biphosphammite.

I have made no general analyses with a view to determine the per centage of the sulphates, or the proportionate quantities of potash and soda; but they must be small, when compared even with the soluble phosphates. It is apparent, however, that potash is vastly more abundant than soda; and that all the soluble salts together fall considerably below the quantity of insoluble bone phosphate. It is also obvious that the prevalence of acids is, on the whole, so great as to restrain within very narrow limits the escape of ammonia in the handling of the material; and, after a proper incorporation with our artificial superphosphates, its loss must be hindered altogether.

CHARLES UPHAM SHEPARD, Sr.

Laboratory of the Medical College, Charleston, April 8, 1870.