

due to Foureroy and Vauquelin. In a sample brought by Humboldt from the Isles of Chincha they found:—

1st. Uric acid, in part saturated with ammonia and lime

2nd. Oxalic acid, combined with ammonia and potash.

3rd. Phosphoric acid, united with the same basis and lime.

4th. Small quantities of sulphate of potash, chloride of potassium, and chloride of ammonia.

5th. A little quantity of fatty matter.

6th. Sand, in part quartzose, part ferruginous.

The composition of the ammoniacal guano was definitively fixed. They have since detected some weak portions of xanthine and guanine.

Of fifteen analyses made by Mr. Nisbet upon samples from the Chincha Isles, the composition of the guano was as follows:—

Organic matters and ammoniacal salts	52.52
Phosphate of lime . . . . .	19.52
Phosphoric acid . . . . .	3.12
Alkaline salts, &c. . . . .	7.56
Silica and sand . . . . .	1.16
Water . . . . .	15.82

100.00

Soluble phosphate of lime . . . . .	6.76
Insoluble do. . . . .	19.52

Total phosphates 26.28

Nitrogen . . . . . 14.20

(Answering to ammonia . . . . . 17.32)

The character of the guanos brought from a distance from the coast of Peru is—great richness in phosphate and the almost complete absence of azotous matters. These guanos, whatever may be said in their favour, are known not to possess the qualities, and consequently not the value of an ammoniacal guano, in which there enters, independent of the phosphoric acid, azote immediately assimilable by plants. I do not, in the meanwhile, deny their fertilizing properties. I believe also that it would be easy to render them *ammoniacal*, in putting to profit the properties they possess, when they are dry and in powder, by absorbing from 0.10 to 0.15 of aqueous solutions of sulphate of ammonia, or of nitrate of soda, incessantly, to be pulverulent.

It appears also evident that the earthy guanos and the ammoniacal guanos have all the same origin—the dejections and remains of sea birds. The disappearance of the ammonia in the first is due, probably, to local circumstances, such as the abundance and frequency of rains, which naturally favor the decomposition of organic substances, or the dissolution of salts with an ammoniacal base.

That part of the coast of the South Sea where the ammoniacal guano is deposited, presents, in fact this peculiarity—that upon a considerable extent, from *Tumbez* to the desert of *Atacama*, rain is, we may say, unknown; whilst

beyond those limits, to the north of *Tumbez*, in the impenetrable forests and marshes of *Choco*, it rains almost without ceasing. At *Payta*, situated to the south of that province, when I was there, it had been seventeen years without rain. At *Chopope* (lat. 7 deg. 46 m. S.) it was noted as a memorable event that it rained in 1728. It is true it lasted forty nights, but ceased during the day.

The rarity of rain in those countries is attributed to the permanence and intensity of the S.E. winds. It is in May and June that the blow with the greatest force: the sky is then of admirable clearness. The temperature is lowered by the effects of these currents of air, coming from those austral polar regions, which announce the end of summer (*verona*). There is no storm on this Peruvian coast. An inhabitant of *Piura* or *Seclura*, if he has not travelled, has no idea of thunder. Yet we should singularly deceive ourselves if we imagined that drought is permanent upon the coast. For many months the earth is watered without rain, and the valleys and hills are clothed with verdure; it is then that a period arrives in which the wind from the austral region is replaced by one from the north, scarcely perceptible—so weak, that it has just force enough to move a weathercock, or to agitate the sails of the ships; it is a slight movement of the air—an undecisive calm, indicating that the S. S. E. breeze has ceased. After this change, from July to November the atmosphere assumes quite a different aspect. The wind in assuming by degrees the S.S.E. normal direction, slowly modifies itself. It is then winter (*invierno*). The bright light with which the country was inundated is succeeded by a half-day, which oppresses the spirits; the heaven is veiled with a thick fog, and it is but rarely, during a few bright moments, that we perceive the sun. Regularly between ten o'clock and noon, vesicular vapour rises, and is suspended at a certain height, when it becomes a cloud. During the movement a part of the fog turns into drizzle (*garua*), which moistens the earth in the manner of dew. The *garuas* (that is the Indian term) are never abundant enough to make the roads impracticable, or in the slightest degree to penetrate the clothes; but by their persistence they introduce into the soil enough water to render it fertile, and maintain it in a condition of convenient moistness, when the south wind resuming its impetuosity, drives them away and prevents their appearance. Besides, upon those points, fortunately numerous enough on the coast, the aridity is only on the surface; at a certain depth we meet with a watery sheet, the origin of which is in the *Corderillas*. The pluvial waters received by the mountains of the Andes unless they are extremely abundant, do not always reach the sea. During a course of twenty or thirty leagues they are absorbed by the sand, and as this takes place at *Prera* and