

in form; two or more rows being often placed side by side; and single rows of cells frequently branch off from the main body.

Numerous spiculæ of sponges are also found, the most common of which are simple, smooth, and pointed at each end. Others are bulbous at one end, and pointed at the other; sometimes of considerable length, but usually broken. I have also found one much branched, quadrifid, with two or more of the extremities bifid.

In some sections I have observed fragments of a brown colour, apparently vegetable, and having a similar structure to portions of *Algæ*.

2. *On the PORPHYRY of BELGIUM.* By Professor DELESSE,
Engineer of Mines, &c.

[Communicated by the President.]

THE constituent feldspath of this porphyry occurs in mackled and finely striated crystals, and necessarily belongs to the sixth system. The colour of these crystals is white, or slightly greenish white, with a glassy lustre; and when of a yellow greenish colour, with a fatty lustre. As the hardness of the latter is much less than that of the white crystals, it is probable that they have been altered by infiltration and by pseudomorphosis. When of a red colour, the rubefaction has been produced by atmospheric action.

I have analysed the crystals of a slightly greenish white tint, and tolerably pure specimens, from the quarries of Quenast. They were easily separated from the somewhat darkish green matrix, the latter containing some grains of quartz. They contain—

Silica	63·70
Alumina	22·64
Oxide of iron	0·53
Oxide of manganese	traces.
Magnesia	1·20
Lime	1·44
Soda	6·19
Potass	2·81
Loss by fire	1·22
	<hr style="width: 50%; margin: 0 auto;"/> 99·69

The constituent feldspath, therefore, of this porphyry is *oligoclase*. This oligoclase, as in all porphyries, is scattered through a feldspathic uncrystalline paste, the residue of crystallization, and in which also are found all the substances that are contained in the feldspath, but in somewhat different proportions. I will designate it by the name of *feldspathic paste*. The green colour of this paste shows that it is richer in oxide of iron and magnesia than the feldspath, and this is probably to be attributed to a pseudomorphose, which would tend to transform certain portions; indeed, if the dark green portion

be examined with a microscope, it is seen to be formed of small agglomerated spangles of a blackish green colour, which line the spaces left between the crystals of feldspath, as well as the irregular-shaped cavities in the rock. These spangles are microscopic, and at first sight it is difficult to determine to what mineral they truly belong; but, having extracted some decigrammes of the dark green portions from a fragment of the Quenast porphyry, I found that their loss by fire was 5·29. As we find, by microscopic examination, that these spangles are only mixed with feldspath, which, however, is found in them in a tolerably great proportion, it results therefrom that their loss by fire is still considerably superior to the proportion obtained by previous experiments made on the impure matter, and consequently these spangles are neither mica nor talc, as is admitted by many geologists. With M. Dumont, I consider these spangles, which are very soft, to be a variety of chlorite, which from its green colour, sometimes passing into black, is rich in oxide of iron, and in composition ought to closely resemble ferruginous chlorite* and ripidolith. Its matrix presents, moreover, the greatest analogy with that of the two varieties of chlorite developed in the cells of melaphyres and volcanic rocks, or in the cavities of protogines and talcy rocks.

Quartz is very frequently met with in the paste of this porphyry. M. Drapier† has observed it in dihexaëdral crystals as well as in red quartzose porphyry. This porphyry, however, does not always contain quartz, and according to M. Dumont, this is particularly the case with the variety he discovered at Hosemont; consequently, when the crystallization of the rock took place, there remained but a small amount of silex, and even this was not the case in all its parts.

In some samples, either in those of a light colour, or in those of a deep and uniform colour, there are sometimes observed flakes of amphibole and of green hornblende which are some millimetres long.

Like most porphyries, the porphyry under consideration contains, mixed up in its paste, carbonate of lime and carbonate of iron; iron pyrites is also present‡; in the Lessines porphyry there is also copper pyrites, sometimes crystallized, sometimes amorphous, in nodules of the size of a small nut; and green carbonate of copper, which is either in small veins in the porphyry, or disseminated in an earthy state in decomposed varieties, which pass into a state of clay.

Finally, there is found in it, as in all porphyries having a feldspath of the sixth system for a base, small streaks or veins formed of hyaline quartz, sometimes smoke-coloured, of green epidote, and of white spathose carbonate of lime; and, moreover, in the porphyry of Lessines violet axinite occurs, presenting the forms "équivalente" and "sous-double" of Haüy.

The epidote is here much more abundant than is general in porphyries; in the variety from Quenast, for instance, it forms a very great number of small deposits disseminated partly in the paste, partly in

* Annales des Mines, 4me série, t. xii. p. 223.

† Mémoire couronné par l'Académie de Bruxelles, t. 111. Coup d'œil minéralogique sur le Hainault, par M. Drapier, p. 18 et suivantes.

‡ Coup d'œil sur la Géologie de la Belgique, par d'Omalius d'Halloy, p. 25.

the feldspath; its crystals are microscopic, and far from clear; it has a yellow straw-colour very slightly greenish. Sometimes it is developed in a crystal of oligoclase, the form of which it preserves, taking a yellowish colour and a granular crystalline structure.

I have found that porphyry loses entirely its green colour when treated with boiling hydrochloric acid, before or after calcination; it is therefore impossible to attribute this green colour to amphibole. This results also from what has been said above.

I have ascertained the loss by fire of some samples to be—

1. Porphyry, blackish green with crystals of whitish oligoclase and a little quartz—of Belgium	1·85
2. Porphyry, a greenish feldspathic paste, with crystals of oligoclase, chlorite, quartz, and small deposits of epidote—of Quenast.....	1·97
3. Porphyry, a reddish feldspathic paste, containing crystals of oligoclase, deposits of chlorite forming green spots, grains of quartz, and small deposits of epidote—of Quenast	2·10
4. Porphyry, a bluish green feldspathic paste, with crystals of greenish white oligoclase—of Lessines	5·41

It appears that the loss by fire in the case of the porphyry is generally somewhat greater than that of the feldspath which forms the basis; this, as might be expected, is on account of the mixture of the chlorite; sometimes, however, as with the porphyry of Lessines (see above), the loss by fire surpasses that of the feldspath (see p. 6) by some hundredth parts, which must be attributed to the presence of a carbonate.

I have experimented, with the view of fixing approximatively the mean composition of the mass of the rock, on a sample coming from the first quarry of Lessines. It had a deep green paste in which chlorite was disseminated; its crystals of greenish white oligoclase were easily detached. A gramme of the sample, calcined and pulverized, was submitted to hydrochloric acid for twelve hours in order to ascertain the proportion dissolved in the acid; and I obtained a greyish or nearly colourless residue, its weight being 75 per cent. of that of the sample operated upon. A fourth part of the rock had been dissolved, and I found that the oligoclase had been partially attacked, for the solution contained some centigrammes of alkalies. As to the undissolved residue, it was formed of 18·50 of silica, separable by solution in potass, and of 56·50 of entirely unaltered substances.

The oligoclase of the porphyries being affected by hydrochloric acid, it is seen that the mixed carbonates cannot be exactly determined by the proportion of the bases which are dissolved in this acid, even when the rock has for basis a feldspath rich in silex like the oligoclase.

The sample of the porphyry of Lessines contained, moreover:—

Silica	57·60
Alumina and peroxide of iron	25·00
Lime	3·23
Magnesia and alkalies	9·92
Water and carbonic acid	4·25

100·00

This porphyry is but poor with respect to silica, and specially inferior to the oligoclase which had been previously analysed : this is accounted for by the presence of the chlorite and carbonates ; besides which, the sample contained no quartz.

It is clear that the proportion of oxide of iron, of magnesia, and of lime, as well as the loss by calcination, must be more considerable than in feldspath, whilst that of alkalis is, on the contrary, less.

Although the porphyry of Belgium contains quartz, its proportion of silica is very notably smaller than that of quartzose porphyry properly so-called, which is rarely inferior to 70 per cent. ; it has a basis of oligoclase and contains no orthose, which, on the contrary, is the predominating feldspath of the latter ; consequently these two rocks differ in a very important mineralogical character.

The porphyry of Belgium, which has just been described, is met with over a small extent on some isolated points ; particularly in some slaty districts. At Quenast it forms a small hill surrounded by slaty schists, in contact with which the porphyry becomes laminated. At Lessines, on the contrary, it divides into prisms.

The geological map of M. Dumont, accompanying the work of M. d'Omalius d'Halloy on the Geology of Belgium, indicates the localities where this porphyry has been recognised ; besides Lessines and Quenast, there might be cited some other points between Enghein and Nivelles, Pitrel on the Metragne, Hozemont west of Liège, Hen-nurjeres south of Audimont, &c.

This porphyry is susceptible of being decomposed by the kaolinization of its feldspath, and this is particularly observed in its upper parts exposed to atmospheric action ; ultimately it is transformed into a coloured kaoline, and a yellowish brown hydro-oxide of iron, in which some grains only of quartz remain.

This porphyry, which is employed for paving, is worked in extensive quarries ; from which are obtained the paving-stones used in Brabant, in Flanders, and in the greater part of Belgium, as well as in Holland. During the last few years it has had to compete with the brown freestone of Fontainebleau. It furnishes pavements of indefinite hardness, never becoming friable like the brown freestone ; they have, however, the great inconvenience of becoming, when worn smooth, too slippery for horses.

3. On the ROSE-COLOURED SYENITE of EGYPT.

By Prof. DELESSE, Engineer of Mines.

[Communicated by the President.]

THE rose-coloured syenite of Egypt is formed of *quartz*, *orthose*, *oligoclase*, *mica*, and frequently also of *hornblende**.

The *quartz* is hyaline and grey ; it has sometimes a slight violet

* See also Lieut. Newbold on the Geology of Egypt, Quart. Journ. Geol. Soc. 1848, vol. iv. p. 340.