ART. XII.—*Account of a fall of Meteoric Stones near Danville, Ala., with an analysis of the same* ; by J. LAWRENCE SMITH, Louisville, Ky.

ALTHOUGH the meteorite of Danville, Alabama, fell in Nov., 1868, and an analysis has been made of it during the past summer, it is only recently that I obtained a complete account of the phenomena attending its fall.

On Friday evening, Nov. 27th, 1868, about five o'clock, Mr. T. F. Freeman, of Danville, (about lat. $34^{\circ} 30'$ and long. 87° W. Greenwich), on stepping from his house, was startled by a loud report, so much like artillery that for the moment its origin was attributed to the firing of a small piece of artillery kept in the village, but on inquiry it was ascertained that no firing had taken place there, but that the sound was heard at the village, and attributed to very heavy artillery at Decatur, Trinity, Hillsboro, or some other point to the northward of Danville. During the war, artillery had been often heard in the valley of the Tennessee, and various speculations were indulged in as to what was meant by this cannonade at such a time of day and in such a direction.

The following day, Mr. Wm. Brown, living three miles west of Danville, brought to the village a piece of rock which he said fell near him and some laborers, who were picking cotton. He dug it up at a depth of about $1\frac{1}{2}$ to 2 feet. It weighed about $4\frac{1}{2}$ lbs., and had the characteristic aspects of a meteoric stone; but it was broken by the party obtaining it, and all but about half a pound, now in my possession, has been scattered and probably lost or thrown away.

Several other stones fell in the same vicinity. Some negroes working in a cotton field on the plantation of Capt. McDaniel, half a mile from Danville, heard a body fall with a whizzing, humming sound, and strike the ground near them with tremendous force; but they were alarmed and did not approach the spot that night; a rain fell during the night and no trace of it could be found the next day. Various other stones were heard to fall in different parts of the adjacent country. Two brothers, by the name of Wallace, were ploughing in their field, about $1\frac{1}{4}$ miles N. W. of Danville; they distinctly heard two or three fainter reports, after the first loud one, and heard the sound of two falling bodies whizzing down, one to the right and the other to the left of them.

With the above data, and the known geography of the country, its direction must have been N. E. and S. W., but it is impossible to say from which of these quarters it came.

The portion of the meteorite that I possess has a large portion of it covered with the usual black crust. Its general aspect is rough and dull ; a portion of the outer surface, not covered with the black coating, is nevertheless a surface that it had when it reached the ground, for on this surface are streaks and little patches of a bright, pitchy matter, which was once fused, and was derived either from another part of the coating that was thrown off in a melted state from the coated portion, and whipped around, (as it were), on to the unfused surface as the stone fell through the air, or from an incipient fusion that was begun on the denuded surface, and arrested by the termination of the fall. Where the black crust reaches the denuded places, it appears to be rounded off, as if it had been melted matter passing from another portion of the stone, and rolled over the surface of the borders.

The broken surface has a dark gray color, and is somewhat oolitic in structure, but not as much so as many other meteoric stones. There are veins and patches of a slate-colored mineral running through it. Pyrites and iron are also to be seen diffused through the stone ; thin flakes of the iron giving that slickenside-like appearance to a fracture not unfrequently seen in this class of bodies. There seems to be more of iron in the slate-colored mineral than in the other parts. There are a few patches of white mineral, which I take to be enstatite. The specific gravity of the stone is 3.398.

For further examination, a portion of the meteorite was separated mechanically into three parts ; the pyrites, the metallic iron, and the earthy minerals. As in the case of most meteorites, the earthy minerals were so intermixed that it was impossible to separate the different varieties, three of which were easily traceable by the eye.

The iron separated with great care from the pulverized meteorite constitutes 3.092 per cent of the entire mass, and an analysis furnished

Iron,.....	89.513
Nickel,.....	9.050
Cobalt,.....	0.521
Copper,.....	minute quantity
Phosphorus,.....	0.019
Sulphur,.....	0.105
	<hr/>
	99.208

The sulphid of iron detached very carefully from the mass of the meteorite gave

Iron,.....	61.11
Sulphur,.....	39.56
	<hr/>
	100.67

which corresponds with the protosulphid of iron, FeS. Whether it contains any of the sulphid known as troilite I am not prepared to say.

The stony minerals were freed as much as possible from iron and pyrites, and one gram treated with ten grams of hydrochloric acid on a water bath, and evaporated nearly to dryness, then filtered and the filtrate well washed ; after which, the residue in the filter was warmed with a solution of caustic soda to dissolve any silica belonging to the portion dissolved by the acid ; it was then filtered again and washed. The result was

Soluble portion,	60·88
Insoluble portion,	39·12

The treatment by a solution of caustic soda or potash is of importance for a correct result, as otherwise a portion of the silica of the decomposed minerals will be estimated with the portion that is undecomposed.

The insoluble portion was analyzed ; for although the analysis made in this way cannot furnish any positive indication in regard to the true mineral constitution of the meteorite, it is, nevertheless, an important guide. It was found to consist of

Silica,	50·08
Alumina,	4·11
Protoxyd of iron,	19·85
Magnesia,	20·14
Lime,	3·90

98·08

From all the circumstances connected with this mineral, its physical characters, &c., it is doubtless a pyroxene of the augite variety.

The soluble portion, owing to the unavoidable presence of a little iron and pyrites, simply furnished results on analysis that showed it to be mostly olivine. The only matter, as a whole, freed as much as possible from pyrites and nickeliferous iron, gave

Silica,	45·90
Protoxyd of iron, ...	23·64
Magnesia,	26·52
Alumina,	1·73
Lime,	2·31
Soda,	·51
Potash,	·64
Oxyd of manganese, a minute quantity, not estimated.	
Oxyd of Chrome, " " " "	
Phosphorus, " " " "	
Lithia—marked reaction with the spectrocope.	
Sulphur,	1·01

The excess in the footing up of the analyses above 100 per cent is due to the fact that a part of the iron, estimated as protoxyd, is combined with sulphur forming sulphid of iron.

This meteoric stone is similar in every respect to that which fell March 28th, 1859, in Harrison county, Indiana, (which locality I see referred to, in catalogues of meteorites, as Harrison county, Kentucky). This meteorite is therefore composed of

Nickeliferous Iron,-----
 Olivine,.....
 Pyroxene,.....
 Protosulphid of iron,.....

with minute quantities of schreibersite, chrome iron, and probably albite.

In concluding these observations on the Danville meteorite, I cannot but feel more and more convinced of the importance of a thorough reëxamination of the mineral nature of the meteoric stones, and in the present case, I am not at all satisfied that the mineral characteristics are perfectly made out.