

ART. XXV.—*Contributions from the Sheffield Laboratory of Yale College.* No. XXI.—*On the Meteoric Stone which fell Dec. 5th, 1868, in Franklin Co., Alabama ;* by GEO. J. BRUSH.

IN a letter addressed to the editors of this Journal, dated Tusculmbia, Ala., Dec. 22d, 1868, Mr. Benjamin Pybas stated that an aerolite weighing 1 lb. 9½ oz. had fallen four miles south of Frankfort, in Franklin Co., Ala., on the 5th of December. Subsequently, through Mr. Pybas's influence, the stone was sent to me for examination. Mr. Pybas has taken great pains in collecting all the facts connected with the fall, as will be seen by the following abstract from a letter received from him in March last.

“The meteorite fell Dec. 5th, 1868, four miles south of Frankfort, the county town of Franklin County, Alabama. The country around Frankfort is broken and hilly, being the termination of the western branch of the Cumberland Mountains. Frankfort is sixteen miles southeast of Tuscombua.

“Mr. James W. Hooper witnessed the fall and describes it in a note to Dr. T. D. West, which I copy. ‘About 3 o’clock, p. m., the afternoon being cloudy and cold, we heard a strange, harsh, roaring noise up in the air. Three distinct reports were heard; at first these were supposed to be cannon, but the noise immediately changed into a series of bursting sounds, like a great fire blazing and crackling through the air. It appeared to pass from the north toward the south. Immediately after the first sound or roaring had passed over, another was heard coming from the same direction, like the whizzing of a bomb-shell as it cuts through the air, making a loud humming noise. I gazed intently in the direction of the noise and found that something was coming downward at a rapid rate. I looked, with my hand up, standing in a dodging position, for fear of its striking me, until I saw it strike some willow sapplings about seventy or eighty yards from where I was and fall thence to the ground. Upon going to the spot I found a strange looking rock, nearly buried in the ground and still warm.’

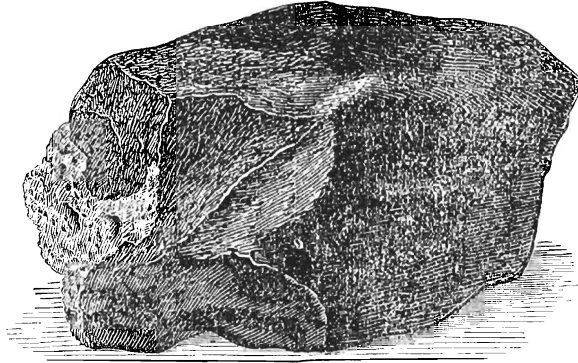
“Major Slass, editor of “the *Alabamian and Times*” in this place, has taken considerable trouble to collect all the information he could on the subject. He says, ‘that the noise was heard for several miles around, before the final explosion. It burst, apparently, over the heads of twenty men, who were at work felling wood, one and a quarter miles from Mr. Hooper’s house. One piece appeared to go southeast, another southwest, and the third northwest. There were afterward heard the reports resembling the bursting of shells. One piece was heard to fall some distance from Mr. Hooper’s, making a loud, crashing noise and frightening a lot of hogs near by.’

“The reports resembling artillery were plainly heard for twenty or twenty-five miles east and west of Frankfort, and from fifteen to twenty north. I have no information as to the south. Mr. Hooper deserves much credit for noting the particulars of the fall, and for sending the meteorite for analysis and description. He refused with scorn, money offers that must have been tempting to a person of limited income, preferring the advancement of science to dollars and cents.

“In a personal interview, he told me that he was sitting by a fire with his family when he heard the first noise. He instantly arose and walked forty or fifty yards from the house before the meteorite fell. His sister, Miss Hooper, living near,

called to her brother to 'run quickly, the house is on fire—don't you hear it?' Mr. H. thinks it was three or four minutes from the first noise until its fall. The place where it struck the ground is a partially decomposed conglomerate, mixed with vegetable mould. The fracture was made by striking a fragment of limestone rock."

When received by me the meteoric stone weighed 615 grams. The crust was entire with the exception of a small corner, although the whole mass seemed to have a fresh fracture running through it. The weight of the entire meteorite could not have been over 650 grams. The accompanying cut will serve to



give some idea of its general outline; it is drawn half the actual size of the stone. The coating has a very brilliant luster, as bright as if newly varnished, strongly resembling that of the Stannern, Petersburg, Tenn., and Bishopville stones. It seems to have been in a condition of viscid fusion as shown by the ridges on the edges represented by the white lines. The crust was so thin in some parts that fragments of olivine could be distinguished through it.

On the fractured surface, as seen by the naked eye, it presented a pseudo-porphyratic structure, having a gray ground with black, green, white and dark gray spots upon it. A careful microscopic, mineralogical, and blowpipe examination of the different parts was made, with the following results: 1. The *black* mineral was coal-black, brightly lustrous and slightly magnetic; B.B. difficultly fusible and became more magnetic; on treating with the fluxes it reacted for chromium and iron; it proved to be *chromite*. 2. The *white* mineral fused with difficulty to a transparent glass, reacted for silica and soda or lime. I could not determine whether it was *chladnite* or *anorthite*; it seemed too difficultly fusible for *labradorite*. 3. A *yellowish green* mineral passing into *yellow* and also apparently

shading into *dark gray*; this was fusible with difficulty on the edges and became magnetic on heating; the green mineral appeared to be olivine, but the gray had also the same pyrognostic characters, while in physical characters it cannot be distinguished from Haidinger's *Piddingtonite*, found in the Shalka meteoric stone. 4. The lens revealed brilliant points with metallic luster, which on examination proved to be sulphid of iron (*troilite*). 5. One or two delicate black veins were observed with the glass which were at first supposed to be schreibersite, but I was unable to detach enough for a blowpipe test, and a careful qualitative examination showed no traces of phosphorus. 6. On pulverizing several grams of the stone I found a few flakes of niccoliferous iron, amounting in all to a few hundredths of one per cent of the mass.

The specific gravity of the stone in four determinations gave 3.35, 3.33, 3.31, 3.26, the mean being 3.31.

An attempt was made to separate the different silicates by the action of chlorhydric acid. It was found, however, that only about 26 per cent of the mass was soluble in acids, and the bases in the acid solution and in the insoluble portion were the same, save that the insoluble contained all the *chromite*. A complete analysis of the meteorite was made by fusion with carbonate of soda with a small amount of nitrate of soda to effect the oxydation of the chromium and the sulphids and metallic substances present. The alkalies were determined by Smith's method. The results of the analysis, commenced by myself but completed by Mr. Wm. G. Mixter, were as follows:

Silica,	51.33	Oxygen.	26.37	
Alumina,	8.05		3.75	
Ferrous oxyd,	13.70		3.04	} 12.28
Chromic oxyd,	0.42			
Magnesia,	17.59		7.04	
Lime,	7.03		2.06	
Soda,	0.45		.11	
Potash,	0.22		.03	
Sulphur,	0.23			
Niccoliferous iron,	tr.			
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	99.02			

The chromic oxyd corresponds to 0.62 per cent chromite, and the sulphur to 0.63 troilite.

From this composition it would appear that the mass is probably made up of uni- and bi-silicates. In a preliminary qualitative-quantitative analysis I found that more lime was contained in the acid solution than in the portion undecomposed by acid, while with the magnesia the larger amount re-

mained in the insoluble residue. The silicate decomposed by acids containing lime is most probably either anorthite, labradorite or a lime-olivine. The large portion of magnesia and iron insoluble in acid indicates the presence of a pyroxenic mineral. Further investigation is needed to fully establish the specific character of the constituent minerals of this meteorite, although we are justified in concluding that it contains an olivine, a pyroxenic mineral and a feldspar, besides chromite, troilite and a very small amount of niccoliferous iron. I think by sacrificing a large portion of this stone that its constituent minerals could be mechanically separated from each other by careful selection with the aid of a magnifier, and their specific characters accurately determined by analysis. At present I do not feel at liberty to undertake this, but hope at some future time to return to the study of this problem.

In general physical characters this meteorite very much resembles the Petersburg, Tenn., meteoric stone analyzed and described by Prof. J. Lawrence Smith.* It has the same lustrous coating, and the constituent minerals are very much the same in character. It seems to belong to the class of meteorites that Prof. G. Rose† calls *Howardite*, and which he describes as being granular mixtures of olivine, with a white silicate (*anorthite?*) and a small amount of chromite and niccoliferous iron. This class, according to Rose, includes the stones from Loutalox, Bialystok, Mässing, Nobleborough and Mallygaum.

I take pleasure in expressing my thanks to Mr. Hooper for his generosity in placing the stone at my disposal for examination, and to Mr. Pybas for his great interest in furnishing the data connected with its fall.

Sheffield Laboratory of Yale College, May, 1869.