WITH the July number *The American Museum Journal* begins its appearance as a quarterly. The leading article, illustrated, is on 'Martinique and St. Vincent Revisited,' by E. O. Hovey. Accessions are noted in various departments as well as the complete rearrangement of the halls of vertebrate paleontology on the alcove system, so that the attention of the visitor is concentrated on a given group. In connection with forthcoming improvements it is announced that two assembly rooms will be provided for the use of scientific societies. The supplement to the number, 'Guide Leaflet No. 11,' is devoted to a description of 'The Musical Instruments of the Incas,' by Charles W. Mead.

Bird-lore for July–August contains articles on 'The Bird Life of Cobbs' Island,' by Frank M. Chapman; 'In the Haunts of New Zealand Birds,' by Charles Keeler; 'The Loggerhead Shrike in Massachusetts,' by Jane Atherton Wright; 'System in Field Records,' by Eugene Murray-Aaron and 'Some Notes on the Psychology of Birds,' by C. William Beebe. There are the usual notes and reviews, and among the illustrations the fifth series of portraits of *Bird-Lore's* Advisory Councilors.

DISCUSSION AND CORRESPONDENCE.

ADDITIONAL FACTS CONCERNING THE BATH FURNACE METEORIC FALL OF NOVEMBER 15, 1902.

TO THE EDITOR OF SCIENCE: Since the announcement concerning Bath Furnace Aerolite No. 1, which appeared in SCIENCE of January 16, two other pieces have been found; one picked up within one hundred yards of where No. 1 fell, and the other one three fourth mile south of this. Named in the order in which they have been found, we have designated these as No. 2 and No. 3, respectively.

No. 2 weighed 223 grams. It was completely coated with the black enamel or varnish and pitted. It has been sawed into two pieces: one for the Field Columbian Museum and the other for the Kentucky State College Museum. It has the same specific gravity and presents the same interior appearance as Bath Furnace No. 1.

No. 3, found about the middle of May last, by a hunter who was led to search for it by noticing a skinned place some distance up on a white oak sapling, will weigh about 200 pounds. It is also completely coated with the black enamel, and is very characteristically pitted and furrowed. These furrows radiate from a smooth nose or boss. It was this portion which bruised its way downward into the base and roots of the tree. The side opposite to this is flat and not furrowed nor pitted, but presents a few nodular excrescences.

As a result of visiting the locality, examining the places where the pieces struck and securing the accounts of the residents, all of whom were much startled by the blinding light and terrific detonations accompanying the fall, I gather the following: There was probably one mass originally, which burst at a height of from eight to nine miles into many fragments. These fragments struck the earth in a district some four miles square, situated in the knobs of the extreme southern portion of Bath County. Most of the region is thinly populated. No. 3 was found almost in the center of this thinly populated district. The accounts given by the residents of the noise made by the 'explosion,' of the singing of the fragments as they hurtled through the air, and the sound made by their striking the ground or hitting the timber on the knobs, were very graphic.

No. 3, which is probably the main portion of the original mass, has left some record from which possibly the trajectory of this celestial body may be computed. From the way in which it grazed the sapling in its descent, and bruised its way into the roots of the tree at the base of which it was found, I estimate that it came in from a direction 13 degrees south of west, and at an angle from the horizontal of 77 degrees. As previously announced, the altitude of the point of the bursting of the meteor, as seen from Lexington, was 9 degrees and 30 minutes. The azimuth of this point is N. 81 degrees E. The point of fall, however, plots out on

the map almost due east of Lexington, and distant 51 miles.

Two other saplings in the vicinity of where No. 3 fell, distant, respectively, about 100 and 200 yards, in an easterly direction, have been broken off by missiles striking them from the west. Search for where these buried themselves in the ground was not rewarded with success.

The dent in the road made by No. 1 had become obliterated, but from the accounts of those who saw it soon after it was made, it dipped eastward, and so is in line with the evidence afforded by the other fragments.

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THE PROTECTIVE FUNCTION OF RAPHIDES.

To the Editor of Science: In view of Dr. Wiley's interesting account (printed in Science of July 24) of the raphides of *Colocasia antiquorum*, it may be worth while to quote the description of these crystals and the cells containing them given by Haberlandt in his 'Physiologische Pflanzenanatomie,' edition 2, pp. 448, 449, 1896, translating literally:

"That in numerous cases the crystals of calcium oxalate, when they occur as raphides or spear-shaped crystals, are also to be regarded as functioning secondarily as a mechanical means of protection against animals that would feed upon the plant, is beyond doubt. Schroff has proved that the irritating effect of the sap of the bulb of *Scilla maritima* depends upon the penetration of the skin by the raphides, and that filtered sap produces no irritation. Stahl * afterwards demonstrated the same thing as holding true for other plants, especially *Arum maculatum*, and showed by experiment that leaves of that plant, when merely treated with alcohol, were hardly touched by snails, while on the other hand, leaves treated with dilute hydrochloric acid, in which the raphides were dissolved, were very quickly devoured. The ejection of the numerous crystal needles from the cell containing them is largely effected through the absorption of water by the strongly swelling mucilaginous substance which always encloses the bundle of raphides. That the form of the containing cell, as well as the manner in which its walls are thickened, is in many cases an adaptation to the protective function of the raphides, is indicated by the following example.

"In the leaves of *Pistia Stratiotes* [which like *Colocasia* and *Arisæma* belongs to the Arum family], the one-layered plates of parenchyma that make up the aerenchyma (breathing tissue) contain transversely placed, spindle-shaped, elongated cells [almost cigar-shaped in Haberlandt's figure] containing raphides. Both ends of these cells project into the intercellular air spaces. The blunt ends of these cells have an extremely delicate cell wall, while the rest of the cell wall is rather thick, although not cutinized. Upon mechanical injury to the cell, although not, however, through the simple presence of water, the raphides are ejected, generally one at a time, with considerable force through the swelling mucilaginous envelope, whereby the thin portion of the cell wall is pierced and soon completely disappears. The place of exit of the raphides is in this case determined by the thin part of the wall and, furthermore, the conical tapering of the ends of the cells prevents the whole bundle of raphides being ejected at once. As the raphides are projected one after the other, the attacking animal can be wounded in different parts of the body."

Thos. H. Kearney.

* The utility of raphides in protecting plants from snails is quite fully discussed by Stahl in his interesting paper entitled 'Pflanzen und Schnecken: Eine biologische Studie über die Schutzmittel der Pflanzen gegen Schneckenfrass,' *Jenaischen Zeitschrift für Naturw. und Med.*, Vol. 22, pp. 84–99 of the reprint.

SHORTER ARTICLES.

CARBONIFEROUS FOSSILS IN 'OCOEE' SLATES IN ALABAMA.

The age of the semi-crystalline and crystalline schists which extend in continuous belt from New England to Alabama, has long been a subject of discussion and of wide difference of opinion among geologists. On the one hand, they have been considered as pre-Cambrian;