The various papers presented, whether offered to Section C or to the American Chemical Society, will be classified, in so far as possible, under certain general topics, and in this manner will be distributed among the sessions throughout the week.

Brief abstracts of all original papers to be presented should be forwarded to the committee on program, W. A. Noyes, Terre Haute, Ind., Chairman, as early as convenient, and *not later than June 10.* Papers to be presented at the meeting are not necessarily in the same form as those prepared for publication. For public presentation few details should be given, and papers should consist chiefly of a clear and reasonably concise statement of the results which have been obtained and the conclusions reached. Abstracts should be accompanied with a statement of the time desired for the presentation of the paper. Persons presenting general addresses and reviews under special arrangement with the committee need furnish only a brief outline as an abstract.

ALBERT C. HALE,
Secretary of the American Chemical Society.
BROOKLYN, N. Y.

FRANCIS C. PHILLIPS,
Secretary of Section C of A. A. A. S.
ALLEGHENY, PA.

ON PYRITE AND MARCASITE.

TO THE EDITOR OF SCIENCE: In your number for November 1, 1901, abstract is given of an excellent paper by Dr. H. N. Stokes 'On Pyrite and Marcasite,' published in full in *Bulletin* No. 186, of the U. S. Geological Survey. The new method here proposed for quantitative determination of these minerals involves many intricate precautions which have been carefully and thoroughly worked out. So that although the process and apparatus seem to call for rather difficult manipulation, the method is likely to be very welcome to every student of this subject. Proper criticism of its details could only be justified by repetition of the process. In the absence of this I am entirely ready to accept its logical results, viz., that in this chemical method we at last possess a satisfactory means for discrimination of the two minerals and for approximate determination—to a degree of accuracy of within 1 to 3 per cent. in Dr. Stokes's skilled hands—of the amount of each in the generally composite specimens of pyrites found in nature.

There are certain inferences, however, which I cannot recognize as proved, in opposition to views advanced many years ago in my paper 'On the Variation of Decomposition in the Iron Pyrites; Its Cause, and Its Relation to Density' (*Annals of N. Y. Acad. Sci.,* Vols. III. and IV., 1887).

1. Dr. Stokes maintains 'that the hypothesis that most specimens of pyrite and marcasite, even when well crystallized, are mixtures of the two, or paramorphs, is without foundation.' Of the truth of that hypothesis, I think, much confirmation is found in the results obtained by this chemical method. In my paper (*loc. cit.,* pp. 179–180) it was pointed out for the first time 'that, on a fresh fracture, unaffected by alteration, the true color of marcasite is invariably *grayish white, nearly tin-white';* while 'normal pyrite has a pale brass-yellow color' (p. 213). These color characteristics of the normal native minerals are accepted by Dr. Stokes, but further assumed by him as criteria for discrimination of the *pure* minerals, the very problem under investigation. Thus, in the determination of the oxidation-coefficient, *p,* five samples of pyrite and nine of marcasite were selected 'as being free from visible impurity and showing characteristic crystallization.' These fourteen samples served as the standards on which all following determinations of this coefficient have been based; apparently the same criteria were assumed in selection of the samples ground up for mixtures, in application of the process to calculation of the curve. But the visibility of impurities may have little value in their recognition, above all when the admixture becomes molecular. Even those samples, at the one extreme, selected for purity and mostly for perfection of crystallization, have revealed to Dr. Stokes, in the variations of *p,* the intermixture of one or of the other mineral, as well as of other impurities, in notable amount. At the other extreme (page 36 of his paper), out of 13 miscellaneous

specimens, six (Nos. 16, 19, 20, 22, 23 and 25) display paramorphic constitution, the amount of marcasite varying from 3 to 74 per cent.; this, too, notwithstanding that the intermixture is invisible, and that it presents the color and sometimes the crystalline form of one or the other mineral. The possibility of purity in some samples of pyrite had been shown in 12 specimens of my paper (page 204) and is confirmed by 5 out of 6 in another series of Dr. Stokes's (page 39); but even there the existence of paramorphism is proved by the last, No. 33, which, with at least the white color of marcasite, is found by Dr. Stokes to contain 83 per cent. of pyrite. Abundant evidence appears in both papers to prove the variation in intermixture in specimens of both minerals; the visibility of the impurity, when in the form of mechanical intermixture, as granules, films, etc.; and its invisibility when present, even in large amount, in molecular diffusion.

2. It is Dr. Stokes's view 'that the density affords no criterion of the composition,' in opposition to my statement that 'the latent constitution of these composite minerals is indicated by variation in density, exactly proportionate in most cases to the amount of each constituent.'

aside from the influence of their unquestionable intermixture. With the new evidence from Dr. Stokes's experiments, I am the more inclined to believe, at least, that these variations in density are caused by so many and such irregular conditions that they may not afford us reliable evidence as to the proportion of one, the marcasite impurity, in those specimens whose unusually low density, below 4.88, may indicate the influence of enclosures, cavities or abnormal composition. But the table of Dr. Stokes (page 39) has no bearing on this conclusion, since in specimen No. 28 the composition was not deduced from density, but, as in two others, from the abundant tarnish (page 204 of my paper), and Nos. 29 to 32 from abnormally low densities, 4.856 to 4.791; these were below that of marcasite, 4.88, as shown by Dr. Stokes, and therefore plainly due to enclosures of quartz, etc. The same objection disposes of the relevancy of the last four numbers in his table on page 13. All that is of present interest to science is the question whether there is any close relation between the true densities of the two minerals and those of their native specimens. Taking, then, from his tables all the specimens of both minerals of known densities which lie between these datum-points, and for which Dr. Stokes

Nos.	Mineral.	Locality.	Density.	Marcasite Percentage.	
				Stokes.	Julien.
2, 3, 5	Pyrite.....	Col., Conn. and Utah.....	5.018, 5.023, 5.041	0	0
6	Marcasite....	Dover Cliffs, Eng.....	4.881	100	99.5
7	" "	Galena, Ill.....	4.891	100	92.2
9	" "	Linden Mine, Wis.....	4.901	100	84.9
10	" "	Galena, Ill.....	4.886	100	95.8
11	" "	Hazel Green, Wis.....	4.896	100	88.5
12	" "	Weardale, Eng.....	4.880	100	100
14	" "	Webb City, Mo.....	4.887	100	95.1
23	" "	Crow Branch Mine, Wis.....	4.891	74	92.2
28	Pyrite.....	Galena, Ill.....	5.015	0	0
33	Marcasite....	Cumberland, Eng.....	4.987	17	23.3

Further study of etched surfaces, described in my paper, had already led me, during the fourteen years since its publication, to recognize other conditions of structure and of composition which affect the density of pyrites, has ascertained the constitution by his chemical method, the following table presents the entire information on the subject now available. In the last column I have added the proportion of marcasite founded on density.

For this purpose, accepting Dr. Stokes's determination of the density of marcasite at 4.88, the formula given in my paper (page 178) would assume the form

$$x = \frac{17496}{a} - 3485,$$

in which x represents the percentage proportion of marcasite in the specimen under trial, and a the specific gravity of the specimen.

So far as these specimens go, there appears a fair approximation between the results of the chemical method and those founded on density, except in three cases (Nos. 9, 11 and 23), all from lead-mines in Wisconsin, in which Dr. Stokes detected the common enclosure of galenite, etc. Obviously the above series is not well chosen to afford a certain decision either way; only a series of crystallized specimens, with densities lying *between* the datum-points, 5.02 and 4.88, could be of service for satisfactory comparison. Therefore it appears to me that this second inference of Dr. Stokes also remains unproved.

The main object of my own paper in 1887, however, was the establishment of a principle of practical bearing and importance, in reference to roofing slate, coal and building-stone. This was the connection of the stability of the pyrites, whether marcasite or pyrite, in resistance to atmospheric agencies of decomposition, with the higher densities of these minerals, *i. e.*, in their ordinary forms of distribution in nature, apart from association with other sulphide-ores. It was there stated (page 222) that 'the highest stability can be expected only from samples of crystallized marcasite or pyrite whose specific gravity exceeds 4.99 * * * though little danger from decomposition may be expected down to a specific gravity 4.97.' This subject has not been considered in the paper of Dr. Stokes, has no necessary dependence on either of the purely hypothetical views already discussed, and the above conclusion, I believe, so far remains unquestioned.

Alexis A. Julien.

Columbia University.

COILED BASKETRY.

To the Editor of Science: May I say that no coiled basketry of any kind was made by the Indians of North America east of the Rocky Mountains? In the books there does not seem to be one illustration of coiled work taken from the surface of ancient pottery in this area. I am aware that in the Appalachians, and especially among the Cherokees, there is a kind of bread tray made of straw and sewed with wooden splints, after the old-fashioned beehive, but I am not positive that these are of pre-Columbian origin; second, that a little coiled work was done by the Comanches, but they are Shoshonean, and belong west of the Rockies; third, that the Mackenzie River hunting bags of babiche are coiled, but the makers are Athabascan; fourth, that the Central Eskimo make poor trinket baskets in coiled work which look dreadfully modern. With these facts in mind I am not prepared to say, without the permission of my colleagues, that the ancient tribes east of the Rocky mountains knew anything in the world about coiled basketry.

O. T. Mason.

THE MUD SHOWER.

Noticing in Science of May 2, p. 718, an account of a 'mud shower' at Easton, Pa., on April 12, by J. W. Moore, I wish to record the fact that a similar shower was observed at New Haven, Conn., on the same day, but between 4 and 5 P.M., instead of noon. White clothes hanging on lines in the yards were spotted in a very annoying way, every drop of rain leaving a mud-colored spot. The same kind of spots appeared on the window glass of houses. Ladies who attended the ball game that afternoon had their clothes badly spotted, showing that the shower here covered a considerable area, for the game was played on grounds in the suburbs. The shower was a slight one, of short duration, but every separate drop seemed to be charged with dirt. There had been showers of clean rain on the previous day. Is it not possible that the dirt was cosmic dust or of meteoric origin?

A. E. Verrill.