and may be regarded as one of the best expressions of the spirit of the recent reform movement in mathematical instruction.

G. A. MILLER.

STANFORD UNIVERSITY, CALIFORNIA.

SOCIETIES AND ACADEMIES.

THE ST. LOUIS CHEMICAL SOCIETY.

AT the regular meeting of the society on Monday, June 11, Mr. W. R. Lamar presented a paper entitled 'Recent Investigations on the Constitution of Certain Alkaloids.' After a few preliminary remarks on the difficulties encountered in determining the molecular constitution of these substances and on the methods employed for the purpose, the paper was devoted to four substances: namely, conine, nicotine, atropine and cocaine. The society was treated to an exceedingly comprehensive and condensed account of the investigations into the constitution of each of these bodies, indicating the failures as well as the partial and complete successes. This was followed in the case of each substance by a similar account of the efforts at producing the same substances synthetically.

C. J. BORGMEYER,
Corresponding Secretary.

DISCUSSION AND CORRESPONDENCE.

THE HAILSTORM OF JUNE 23.

TO THE EDITOR OF SCIENCE: During the storm which swept the Atlantic coast on Saturday, June 23, the hailstones which fell at Perth Amboy, N. J., and vicinity were of such large size that the following observations from a house on the shore of Raritan Bay may be worth recording. The hailstorm was preceded by the piling up of great masses of cumulus clouds, while out in the Lower Bay a tornado caused a waterspout; there was also considerable lightning and a brief heavy shower of rain, so that the usual conditions for a severe hailstorm were satisfied. About four o'clock big hailstones began to bombard the house, at first few in number and in a very slanting direction, then in a roaring downpour that made the bay spout up into thousands of white geysers. This lasted, perhaps, five minutes.

We immediately gathered some of the hailstones which thickly dotted the lawn. They ranged from the size of a cherry to that of a duck's egg, the larger ones being very abundant. The smaller ones were more or less spherical, consisting internally of broad concentric zones of softer, more snow-like, and of harder, darker ice, the broken surfaces reminding one of polished sections of concretionary nodules of agate. The larger ones were oblate spheroids, oval in contour, with crater-like depressions in the center of each flattened side. The largest ones filled the palm of the hand, and upon being measured with great care proved to be not less than three and one eighth inches along the long diameter and eight inches in circumference. The surface was irregularly tuberculated, and the center, core or axis of the spheroid was always distinct, appearing in broken hailstones as a small white spot. None were observed in which the nuclei were formed of small pebbles. The hailstones seemed harder to crack in the teeth than ordinary ice.

The impact of their fall caused circular depressions in the hard-packed tennis court, and later on the soft sand of the beach the still unmelted kernel of each hailstone was found in a depression containing a close coil or many concentric circles of sand.

Mr. George H. Pepper, of the American Museum of Natural History, who also observed the same storm in Tottenville, at the southern end of Staten Island, appends the following notes:

The first evidence of the storm in Tottenville was a heavy rain accompanied by a shower of small hailstones about the size of a pea; these stones were similar to snow ice. The rain continued and after an interval of perhaps five minutes a second shower of hailstones was noticed; these ranged from the size of hickory nuts to walnuts. The fall of these stones was followed by the larger ones, the intervals being, perhaps, two or three minutes. The shower carrying the large hailstones lasted not more than three minutes, but during that time twenty-five glasses were broken in the house in which I happened to be. Over fifty glasses in memorial windows

of one of the churches were broken, and almost every house having windows on the western side suffered from the stones. One of the largest stones was measured, the result showing a circumference of nine inches; it was irregular in form, one and a half inch thick and the edge was deeply indented in places. This was not an exceptional stone, as a great many of this size were found.

W. K. Gregory.
American Museum of Natural History.

SAUROPODAN GASTROLITHS.

To the Editor of Science: It may be of interest, in connection with Mr. G. R. Wieland's recent description of the gastroliths found with the sauropod remains in Montana, to call attention to an apparently unrecorded similar discovery at Morrison, Colo. In 1877, Professor O. C. Marsh's party, in charge of Professor Arthur Lakes, obtained among the bones of the type specimen of *Atlantosaurus immanis* Marsh, a number of rounded and highly polished siliceous pebbles whose surface peculiarities resembled those of the gastroliths described by Mr. Wieland. No material of similar size, form, surface markings or composition occurs elsewhere in the Atlantosaurus clays of this vicinity. Professors B. F. Mudge and S. W. Williston were with us when some of these pebbles were found and considered them as identical in origin with the stomach stones that they had recently found with plesiosaurian remains on the plains of Kansas. With the exception of one specimen, now in the collection of fossils in the Denver High School, these specimens were probably sent to the Peabody Museum of the Yale University and might be found in the collections sent to Professor Marsh by Professors Lakes and Mudge from the neighborhood of Morrison during the years 1877 and 1878. The field notes of Messrs. Lakes, Mudge and Williston, if obtainable, might afford additional data and possibly confirm a suspicion of the writer that some gastroliths were also found in connection with the type specimen of the species formerly known as *Apatosaurus ajax* Marsh.

Geo. L. Cannon.
Denver, Colo.

THE SMITHSONIAN INSTITUTION AN INSTITUTE OF RESEARCH.

To the Editor of Science: I desire to emphasize the suggestion made by David Fairchild in Science for June 8, in which he advocates changing the Smithsonian Institution from a museum to an institute of research. It seems to me that this idea ought to appeal strongly to men of science generally throughout the country. It can not be denied that the greatest impetus to research in pure science in the past has been the working together of men earnestly engaged in special lines of research, and the value of such researches has been greater whenever the several investigators have been brought together in one institution or in one laboratory. Experience has shown that under such conditions only as are found, for example, in the Biological Station at Naples, or in the laboratories of the greater German universities, does the most stimulating atmosphere of research exist.

The elaborate and well-endowed scientific projects now in operation, although extremely valuable, can not do for the progress of knowledge what such institutions as the above mentioned are doing. We have in this country large and well-endowed museums that are amply able to care for the work that falls within their respective provinces, but there is no institution that can be looked upon as a common center of research to which the investigator may go to pursue his studies with the necessary equipment and in an atmosphere whose vigor comes from the helpful suggestions and from the keen but friendly criticism of his many colleagues.

Let the Smithsonian Institution, therefore, be the nucleus of such a great national or international institute of research.

David M. Mottier.
Indiana University.

SPECIAL ARTICLES.

EVIDENCES OF GLACIATION IN SOUTHERN ARIZONA AND NORTHERN SONORA.

In the spring of 1905, during a professional trip to Sonora the writer was interested in observing along the Sonora Railway, south of