LETTERS TO THE EDITOR.

**** *The attention of scientific men is called to the advantages of the correspondence columns of* SCIENCE *for placing promptly on record brief preliminary notices of their investigations. Twenty copies of the number containing his communication will be furnished free to any correspondent on request.*

The editor will be glad to publish any queries consonant with the character of the journal.

Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The Keweenawan System.

THE geologists interested in the discussions that have taken place during the past eight years, concerning the relations of the Eastern sandstone to the copper-bearing rocks of Keweenaw Point, will remember that one of the important localities showing that relation is situated on the Hungarian River. In company with James Osborne, F.G.S., superintendent of the Rio Tinto mines in Huelva, Spain, and William Beer of the Osceola Mine, I have revisited this locality. Owing to some changes in the bed of the stream, we are able to trace continuously the unchanged Eastern sandstone into the sandstone which has been baked and indurated by the old lava-flow, and this baked sandstone into the lava-flow or melaphyr itself, all forming a continuous exposed surface. There is no fault or plane of separation between the sandstone and trap, but the two are welded together into one mass. We procured hand specimens, which in one piece show the contact of the so-called 'Keweenawan' system with the Eastern sandstone. The contact is that made by a lava-flow with an underlying sandstone, and is the same as the contacts so often observed within the copper-bearing series, while the sandstone is observed *in situ* to pass beneath the melaphyr. It is my purpose to uncover the contact junction still further, and to publish in time a paper giving sections and detailing results at this and other localities at which the contact has been observed. The above observations sustain fully those made by myself in 1879; and in this case it would seem to forever settle, beyond any possibility of doubt, that the Keweenawan system and the Eastern sandstone are one and the same continuous geological formation, but with the copper-bearing rocks younger in point of time than the sandstone.

M. E. WADSWORTH.

Michigan Mining School, Houghton, Mich., Sept. 19.

Cause of the Purple Coloring of Pigweed-Leaves.

DURING a number of years past I have frequently been struck by a prevalent purple coloring of patches in the leaves of pigweed (*Chenopodium album*), the cause of which did not appear in any surrounding conditions, and up to this summer it has remained to me a mystery. A few weeks ago, however, while examining pigweed in search more particularly of plant-lice and leaf-miners, I again noticed the leaf-coloring, and, upon turning up some of the colored leaves, found on some of them larvæ of a leaf-hopper having the same shade of purple as the colored spots on the leaves. Further examination brought to light more of the larvæ, always on the under surface of the leaf, and within one of the colored spots. Some of the spots were found without any larvæ visible, indicating that they travel about more or less, or that they had been disturbed and had made use of their legs to get out of the way. A few days later (July 25) I examined plants in another locality similarly affected, and found, as before, the colored larvæ associated with the spots. On one leaf, I found close by the cast-off pupa-skin, which still retained enough of the markings to show its relation to the larvæ (an adult), which, on comparison, proved to be the *Thamnotettix seminudus* of Say, — a species rather common throughout the country, but which, so far as I can find, has never been mentioned in connection with its food-habits or larval life. No such coloring results from the presence of plant-lice or other insects on the same plant, and it seems quite certain that we may consider this species as the cause of the peculiar phenomenon. I am not aware that any explanation has previously been given. What kind of secretion is injected into the leaf by the insect, when puncturing it to obtain its food, and how that acts to change the color in the plant-cells, are still open questions. It is evident that the similarity in color of the spots and the larvæ are a protection to the latter.

HERBERT OSBORN.

Zoöl. Lab. Agric. Coll., Ames, Io., Sept. 20.

The Ordinates of Interest in Science at the American Association.

THE oscillations of interest in branches of science, and the rise of, and rapidly increasing interest in, the more recent and sometimes the less difficult departments of learning, as well as the apparent stagnation in the pursuit of science either locally developed or affecting larger areas of population, have been often remarked. It might seem reasonable to suppose that we might be able to review with approximate accuracy the ebb and flow of the scientific tide by watching the fluctuations of study in a representative and national body of scientific workers; in such assemblages as the American, French, and English Associations present us with, where no discriminations are made, and students of all grades and inclinations are welcomed.

The obvious and feasible method to adopt for this purpose would be to note the varying number of papers by different authors in the several classes of study, and compare their aggregates distributed over a number of years. This method we have used here, and yet a little reflection will show that it is deceptive, and possibly in instances leading to quite wrong conclusions. In the first place, while the names of all scientific men in these countries, as a rule, are found on the rolls of these associations, they may, for reasons of convenience or personal comfort, or because they are associates of smaller and more technically limited bodies, choose to publish or read their papers elsewhere. In the second place, many conscientious workers cannot enjoy the opportunity of attending the meetings of the association, and, while authors in a modest way, would be deterred from appearing upon so prominent a platform, though they become members of the association for the sake of enjoying its publications and the pleasure of its recognition. Again, the 'ambulatory' habits of the association may carry it this year into a hot-bed of geologists or in their neighborhood, and in another move it to the hunting-grounds of archæology; so that the method is defective as permitting just inferences as to the fashion or currents of scientific investigations in the association itself, and more evidently as regards the wholesale aspect of national scientific industry.

And yet, with all deductions made, there is a residuum of interest in the results of this examination. They show how evenly in some branches the 'show of hands' at the annual meetings of the association has been kept up, in others how the interest has fallen under the entire average for years, and again risen by a recuperative effort much above it; they give an idea, at least, how some lines of study exceed others in their active participants in the association, and a measure of the rising importance or popularity of others.

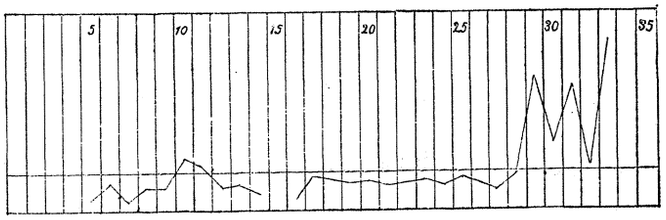
In computing the charts, the whole number of papers by different authors in each department has been taken, and their percentage of all the papers read or accepted, by different authors, used to fix the point of interest in the column corresponding to the number of the meeting quoted. Where an author has prepared a paper on two or more subjects, he is regarded as representing a unit of interest in each; but where he has offered a number on one subject, his activity entitles him to no further recognition, for our purpose, than the single contributions of others. The points of interest are measured from the base-line, and are meant to be strictly comparable; so that the greater general height of one series exhibits the preponderating value of that study. The determination of the proper reference of a paper is in some cases not easy, and the lines might in many ways be changed by a redistribution of the papers, according as the statistician thought the contents of a paper shifted it to a different though allied topic.

Of course, the actual number of papers by different authors in one subject may remain constant, while the percentage of interest would show a decrease, from the re-enforcement of other departments and the consequent larger aggregate of individual papers upon which to reckon. The most instructive conclusions, it seems to us, are drawn from the relative position of the average line of interest, in the different subjects, to the maxima and minima points

and the line passing through them; thus showing at periods an excess over the average, maintained for successive years, and at others a deficit of interest equally prolonged. In many instances the average line lies above the serial points for years, its position being secured by intermittent displays of interest, pushing momentarily the point of interest to a place high above it, for the year in which the display occurred.

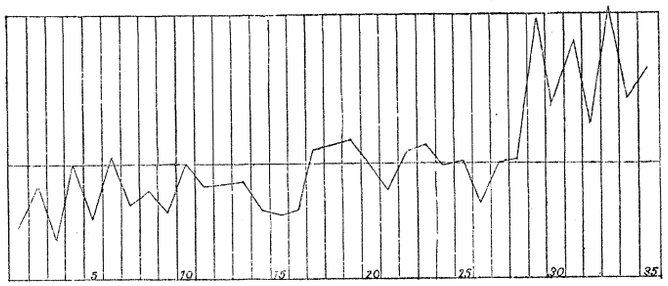
For convenience of reference, the number of the meeting and the place of meeting are here brought together: —

1. Philadelphia.	10. Albany.	19. Troy.	28. Saratoga.
2. Cambridge.	11. Montreal.	20. Indianapolis.	29. Boston.
3. Charleston.	12. Baltimore.	21. Dubuque.	30. Cincinnati.
4. New Haven.	13. Springfield.	22. Portland.	31. Montreal.
5. Cincinnati.	14. Newport.	23. Hartford.	32. Minneapolis.
6. Albany.	15. Buffalo.	24. Detroit.	33. Philadelphia.
7. Cleveland.	16. Burlington.	25. Buffalo.	34. Ann Arbor.
8. Washington.	17. Chicago.	26. Nashville.	35. Buffalo.
9. Providence.	18. Salem.	27. St. Louis.	



ATTENDANCE.

The marked feature of this chart is the striking rise in the last five meetings, the only ones whose percentage is above the average, with the exception of the 9th and 10th. These meetings include some remarkable assemblages, such as those that met at Boston in 1880, Montreal in 1882, and Philadelphia in 1884. The phenomenal nature of those meetings brought large numbers of the members together, elicited enthusiasm, and excited public attention. The Ann Arbor and Buffalo meetings did not continue, we believe, this upward movement.

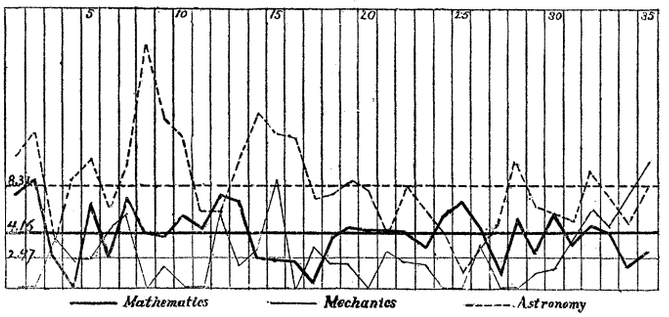


PAPERS.

The papers contributed to the successive meetings, by which is here meant only papers by different authors (except in cases where one author has written in two departments of science), show a synchronous rise with the attendance in the last meetings; but, what is more auspicious, they show an inclination upward from the first, with slight relapses, indicating a prevailing desire among investigators to bring, in some shape, their results before the audience of the association. The papers for the eighth and ninth meetings are low, however, though the attendance then is given as above the average. The rise together of attendance and papers is a healthy sign. It is assumed of necessity that the conditions for admission of a paper are no less or more stringent than formerly.

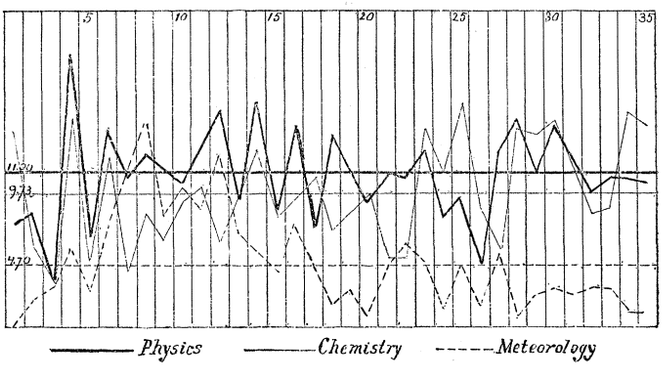
Mathematics, as might be expected from its difficult and unpopular nature, has a low percentage of interest, 4.16. We do not know how this compares with the percentage in other countries, but it must be considered in connection with astronomy, and to some extent with mechanics, — studies of a mathematical habit. Mathematics maintains itself fairly well near the average, rising and falling about equally, and in one part of the series running almost on the line.

Astronomy has a high average percentage of interest, keeps above the line of average during the first half of the association's existence, but is pushed down in the second half by the inrushing recruits to other subjects. This is well shown by the fact that at the Boston (29) and Buffalo (35) meetings the actual number of papers assigned to this subject were only one less in each case than the number at the Washington (8) meeting, when the interest reached its highest point.



The chart of mechanics shows that after comparative apathy and violent fluctuations the points of interest have started upward with probably a significance as yet undetermined. The technical societies, engineering associations, etc., absorb the papers of the mechanical minds, and the recent accessions of papers may have some reference to the condition of these bodies.

Natural philosophy and physics has a high percentage of interest, and its points oscillate up and down over the average line with quite even regularity. Its fascinating qualities and intellectual importance will assure it a steady flow of support, though the later indications would suggest that its percentage will be lowered in succeeding years, as it fails to reach the average for four years. In this subject personal judgment and ignorance may have led us into error, and papers assigned to chemistry might almost as justly claim admission with this.



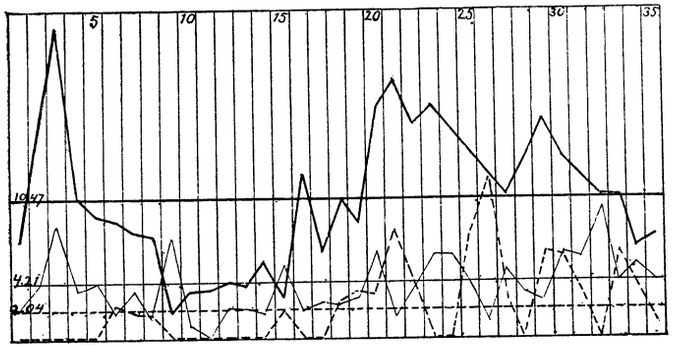
Chemistry everywhere claims attention, and each year its domain and its explorers seem increased. Yet its average of interest is kept up by spurts during the earlier life of the association, a settled higher tendency becoming established only from the 23d (Hartford) meeting, onward. The north-eastern cities seem to stimulate its life in the association, and, generally speaking, it drops as the meetings recede from the Atlantic area. This is less noticeable in recent years, and indicates a wider dissemination of its professors.

Meteorology, which has assumed such first-class prominence in practical affairs, and has attacked new problems formerly unthought of, shows a falling-away of interest in the later years of the association, its average being held up by the tall developments in the 8th to the 13th meetings, when some enthusiastic workers attracted attention to it, unopposed by the widening scope of other branches. It seems to have reached a low ebb, and may show a dangerous facility to disappear altogether.

The average percentage of interest in zoölogy is high, as might be expected; but it seems significant that its points lie beneath the average line in the former part, and above in the latter part, of the association's history. A tendency is discernible, however, toward a lower scale, as from both the 21st (Dubuque) and 29th (Boston) there has been a falling-off, producing the slopes shown in the chart. The sharp ascent in the 3d (Charleston) meeting was given

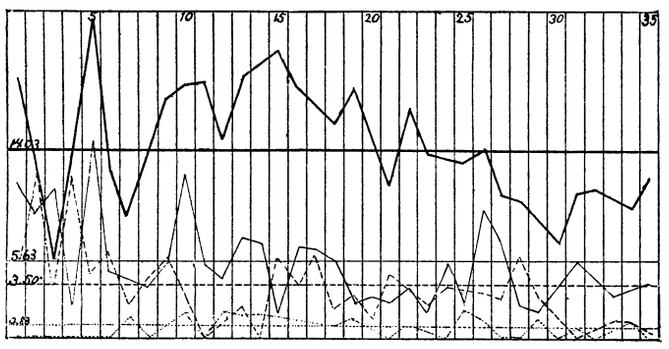
by eight papers in a total of thirty-four, but the relative interest declined after this to a low ebb for eight or nine meetings.

Botany has not been a feature in the association until recently, and its record shows a simultaneous increase in interest. It has not oscillated widely above or below the average, and has been maintained by a band of writers who, while they permitted it to reach extinction in the 11th (Montreal) meeting, have vigorously kept up its respectability. The new and younger botanists have made themselves felt, and it may be anticipated that in the next decade its percentage will rise.



Microscopy has only in later years assumed any importance in the meetings of the association, and in the United States it is only in later years that the use of the microscope has been widely extended. Industrially, technically, in biological and botanical studies, it is beginning to make itself recognized as the handmaid of business and science. Microscopy is yet fitful and timid in its appearances at the association, but these erratic fluctuations probably precede a more even participation in its work.

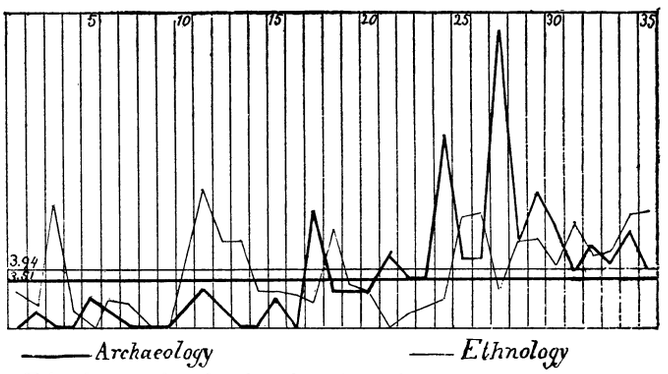
Geology shows the highest percentage of interest (14.03), as might have been expected, amongst the departments. The association itself was the child of a geological club; and geology in a new country, abounding in new details, new material, new problems, apart from its intrinsic value and fascination, attracts numerous followers. Abundance of papers on this subject have always been forthcoming, in this arena met the veterans of the science, and here the everlasting quarrel over 'taconic' and 'primordial' has been fought over again and again, with the confusion of less noticeable collisions and the combat of less distinguished warriors. One thing of interest is observable; i.e., that geology is losing its hold: as with astronomy and other subjects, the growth of new departments, the increase of papers in other branches, is forcing its average down, though the actual numerical display of papers is higher.



Paleontology has a fair percentage of interest, has been quite uniform, but evincing a downward inclination, caused, as with other topics, by the enlarging horizon of the society's activities.

Mineralogy has an intermittent and rather low pulse, but from the 15th (Buffalo) to the 28th (Saratoga) meetings was in a rather healthy state, and has since kept below the average. Its average, indeed, has been sustained by the high percentages given in the earlier meetings, and its general temper is debilitated.

Lithology has barely an existence in the association. The subject is new, its students few and scattered, and much of its material absorbed in papers which are properly geological. Lithology will undoubtedly enter more largely into public scientific discussion in the future.



Ethnology and archæology have been the elements of disturbance which have intruded numbers of papers in recent years, and brought down the percentage of interest in other branches not sufficiently recruited by new accessions. The significant coincidence in the general aspect of these two branches of study shows their important development in the last ten years. They threaten the supremacy of the older studies, both because of their popular character, the interesting nature of their results, and the fertile soil for anthropological investigation in our country.

And here we are suggestively reminded that a valuable analysis of the association returns might be made to determine in what quarters the scientific industry of the country is located. Finally, we offer these observations, imperfectly and too hastily prepared, as a contribution to the interest this meeting of the association should excite.

L. P. GRATACAP.

A North Carolina Diamond.

A DIAMOND weighing 4⅛ carats and 873 milligrams was found on the Alfred Bright farm in Dysartville, McDowell County, N.C., in the summer of 1886, by twelve-year-old Willie Christie, the son of Grayson Christie, who was sitting on a box at a spring, and saw, about two feet from him, what he termed 'a pretty trick.' He picked it up and carried it home, where it lay on the shelf two weeks before he gave it another thought. It was then taken to the village grocer's, John Laughridge's, where various opinions were passed upon it, until at last the conclusion that it was a diamond was reached. It was then sent to Messrs. Tiffany & Co. for valuation. It is quite perfect, but not pure white, having a faint grayish-yellow tint. In form it is a distorted hexoctahedron with partial

twinning (see figures of two views). Its specific gravity is 3.549+, and it measures 10 millimetres in length and 7 millimetres in width.

This stone being more than an average find, the writer thought it would be of interest to visit the locality, and while there in June, 1887, he fully authenticated all the facts of the finding. Dysartville is sixteen and one-half miles from Morganton, twelve from Marion, eight from Bridgewater, and four from Capt. J. C. Mills's gold-mine. A number of supposed diamonds, which proved to be zircon or smoky quartz, have been found here before. No trace of garnet, peridotite, or any of the associations of the diamond, were found near the spot. The sediment at the bed of the spring was taken out and carefully examined, as also the small hollows on the adjacent hillside. This diamond must therefore have been transported in decomposing soil from distant higher ground in the vicinity, during a heavy freshet. Its value as a gem, not counting any value its American origin may attach to it, would be from about one hundred to one hundred and fifty dollars.

GEORGE F. KUNZ.

New York, Sept. 27.