value; the second at the mergence of liquid into solid, a hundred or even one thousand times as large in isothermal value, and characterized by the fact that, whereas freezing pressures may be enormous, the corresponding isothermal melting pressure may even be markedly negative.

If, then, we further inquire as to what will happen if we indefinitely compress the solid along a suitable isothermal, I think it is logically presumable that, with the succeeding and profoundly accentuated volume lag, we shall reach the next atom in a scale of increasing atomic weights.

However enormous the condensation pressure for this purpose may be, it is supposable, in the light of the examples already given, that along an accessible isothermal the disintegrating external pressure of the new atom may be permanently negative. Hence the new atom will persist within the pressure and temperature range available in the laboratory.

But the last stage is virtually identical with the first, or the inherent nature of these changes is periodic. The inference is therefore that, under suitable thermal conditions and continually increasing pressure, the evolution of atoms, of molecules, of changes of physical state, again of atoms and so on indefinitely, are successive stages of periodically recurring volume lag.

Carl Barus.

Brown University.

THE AMERICAN MATHEMATICAL SOCIETY.

The American Mathematical Society held its fourth annual meeting at Toronto, Canada, on Monday and Tuesday, August 16th and 17th. All conditions were exceptionally favorable for the success of the meeting, but the result far exceeded all anticipations. Forty-four members of the Society were registered as in attendance, forming by far the largest body of mathematicians ever brought together on this continent. Among those present were Professor Simon Newcomb, President of the Society, and former Presidents Dr. G. W. Hill and Dr. Emory McClintock. Several distinguished visitors also attended the meeting, among them Professors A. R. Forsyth, A. G. Greenhill and O. Henrici. Twenty-three papers were presented, all by members of the Society. Although the great length of the program necessitated a severe limitation of time for the reading of each paper, the hearty cooperation of the authors with the plans of the committee enabled the Society to conclude the sessions in the two days allowed without the least friction. The meeting was characterized not only by great scientific interest, but also by a cordial spirit of good feeling between hosts and guests.

At the meeting of the Council on Monday evening three persons were elected to membership in the Society and three nominations were received. It was decided to hold the next summer meeting of the Society at Boston, Mass., at or about the time of the meeting of the American Association for the Advancement of Science. Resolutions were adopted by the Society in recognition of the generous hospitality of the University of Toronto and its officers.

A portion of the afternoon session on Tuesday was devoted to a general discussion of the topics mentioned below. The members of the Society were afterward received by President and Mrs. Loudon, of the University of Toronto. On Tuesday evening the members of the Council were entertained at the Toronto Club by Professor Alfred Baker.

The following is a complete list of the papers presented:

MONDAY MORNING.

1. *Upon the representation by ruled surfaces of the curves drawn by mechanisms. Preliminary report, illustrated by models:* Dr. Edwin M. Blake, Purdue University.

2. *A contribution to the theory of plane curves:* DR. L. WAYLAND DOWLING, University of Wisconsin.

3. *A Canadian discoverer of the non-Euclidean Geometry:* PROFESSOR GEORGE BRUCE HALSTED, University of Texas.

4. *Note on the Folium of Descartes:* PROFESSOR ELLEN HAYES, Wellesley College.

5. *A geometrical locus connected with a system of coaxal circles:* PROFESSOR THOS. F. HOLGATE, Northwestern University.

6. *On the solution of the map-color problem:* PROFESSOR P. WERNICKE, State College of Kentucky.

7. *On the Riemann-Helmholz-Lie problem of the foundations of geometry:* PROFESSOR H. B. NEWSON, University of Kansas.

MONDAY AFTERNOON.

8. *Quaternion invariantive operators:* PROFESSOR JAMES BYRNIE SHAW, Illinois College.

9. *The geometry of some differential expressions in hexaspherical coordinates:* DR. VIRGIL SNYDER, Cornell University.

10. *On certain differential equations of the second order allied to Hermite's equation:* PROFESSOR E. B. VAN VLECK, Wesleyan University.

11. *Concerning the cubic involution and the cubic transformation of elliptic functions:* PROFESSOR OSKAR BOLZA, University of Chicago.

12. *The determination of the rational function in the reduction of the general Abelian integral to the sum of a rational function and a fundamental system of elementary integrals:* DR. J. C. FIELDS, Berlin, Germany.

13. *On the reduction of hyperelliptic functions* ($p=2$) *to elliptic functions by a transformation of the second degree:* D. J. I. HUTCHINSON, Cornell University.

TUESDAY MORNING.

14. *Further researches in the theory of quintic equations:* DR. EMORY MCCLINTOCK, New York, N. Y.

15. *A theorem concerning the coefficients of lineal substituting groups of finite order with n variables:* PROFESSOR H. MASCHKE, Chicago University.

16. *On the commutator groups:* DR. G. A. MILLER, Ann Arbor, Mich.

17. *Collineations in a plane with invariant conic or cubic curves:* PROFESSOR H. S. WHITE, Northwestern University.

TUESDAY AFTERNOON.

18. *Concerning regular triple systems:* PROFESSOR E. H. MOORE, University of Chicago.

19. *Theory of discrete manifolds:* MR. F. W. FRANKLAND, New York, N. Y.

20. *Certain transformation problems of canonical equations of dynamics:* DR. EDGAR ODELL LOVETT, University of Chicago.

21. *The true transition curve:* MR. P. H. PHILBRICK, Lake Charles, La.

22. *About sixth power numbers whose sum is a sixth power:* DR. ARTEMAS MARTIN, Washington, D. C.

23. *Preliminary report on alternate functions of complex numbers:* PROFESSOR A. S. HATHAWAY, Rose Polytechnic Institute.

General discussion of the following topics:

1. *The accurate definition of the subject-matter of modern mathematics.*

2. *The vocabulary of mathematics. The possibility of correcting and enriching it by cooperative action.*

F. N. COLE,
Secretary.

CURRENT NOTES ON PHYSIOGRAPHY.

ARTESIAN WELLS OF IOWA.

A COMPREHENSIVE report on the artesian wells of Iowa by W. H. Norton (Iowa Geol. Surv., VI., 1896, 113–428) brings clearly forward the favorable conditions there obtaining for this important source of water supply. The paleozoic strata have a gentle southward inclination, and also a sag over the northern part of the State from the eastern and western boundaries towards a median line. Numerous water-bearing strata, or *aquifers*, occur, from the basal sandstone that lies on the buried hills and valleys of the Algonkian floor to the sandstones of the coal measures. Cretaceous strata in the northwestern part of the State lead water away westward. Some important wells are supplied from aquifers in the glacial drift. Three artesian wells were mentioned in the State Survey Report for 1870, and no systems of water works had been then constructed. About a hundred systems are now in operation, many of them depending on artesian supply. At certain points, where many wells have been sunk, the first yield has slightly decreased, as if the limit of local supply had been reached; but great stores of subterranean water remain unexhausted beneath most of the State.

FORESTS AND DESERTS OF ARIZONA.

THE variation of climate with altitude