which I have been permitted to return to Texas and renew the studies of these formations, have shown that the lithologic aspect of each instead of representing definite and fixed time positions in their horizontal extent, moves upward through the geological column as it is respectively traced east or west from the locality of the standard section in Central Texas, as is shown on the accompanying diagram table. The position of the Austin Chalk ascends to the eastward from Central Texas towards northeast Texas and Arkansas, where it is known as the Anona Chalk, and Alabama, where it is called the Selma.

The Austin Chalk in the course of this ascent practically continues from the Niobrara to the Ripley or near Fox Hills stage of the time column, and is accompanied by corresponding changes in its fauna. This transgression of the Austin Chalk has recently been noted by my associate Mr. J. E. Brantly in a recent report on the oil fields of Alabama, published by the State Geological Survey of that state.

Recently while studying the geology of the Fort Stockton Country in Pecos County, Texas, the writer observed a similar instance of transgression by the Edwards limestone. In this instance both the lithologic and paleontologic facies of the Edwards limestone formation, which occupies a fixed position in the geologic column in Central Texas, is found to have transgressed through time diagonally until it occupies a higher and altogether different one in the vicinity of Fort Stockton, as it is traced to the westward from Austin towards the east front of the Cordilleran Ranges. This formation in both localities largely consists of cellular and semi-chalky white limestones which weathers gray and yellow, accompanied by a characteristic fauna of fossil species (Rudistes, corals, echinoderms, etc.).

In the typical Central Texas section heretofore described the Edwards limestone and its fauna occur in a definite position below the Kiamitia and Duck Creek formation. In the vicinity of Fort Stockton where it occurs as the cap rock of extensive areas, it was found with the same lithologic aspects and fauna as in Central Texas, but its stratigraphic position was found to be above the Georgetown Duck Creek and Kiamitia formations and faunas, instead of below them, as it normally occurs in the Central Texas sections.

DIAGONAL TRANSGRESSION OF THE EDWARDS LIMESTONE AND AUSTIN CHALK

Edwards Limestone — Locality					Time	Austin-Anona Chalk — Locality		
Mexico	Stockton	Crockett	Austin	Fort Worth		Central Texas	N.E. Texas, Louisiana, Arkansas	Alabama, Mississippi
					Gulf Series, Navarro-(Ripley)			×
					Taylor-(Pierre)		×	
					Austin-(Niobrara)	×		
					Eagle-Ford (Benton)			
					Woodbine (Dakota)			
					Comanche-Series, Buda			
		×			Del Rio			
					Georgetown			
					Duck Creek			
					Kiamitia			
				×	Goodland			
					Walnut			
					Paluxy			
					Glen Rose			
					Trinity			

The only hypothesis I have to offer for these peculiar conditions is that during the two epochs similar conditions of depth and environment must have continued with shifting location as time progressed, but at present I can not explain why the fauna of the Austin-Anona Chalk changed with this transgression while that of the Edwards persisted.

This fact may have important bearing upon the correlation of the Texas Cretaceous sections with those of Mexico, and assist in the interpretation of the as yet but little understood formations of the latter county.

ROBERT T. HILL

DALLAS, TEXAS

THE AMERICAN MATHEMATICAL SOCIETY

THE twenty-seventh annual meeting of the society was held at Columbia University on Tuesday and Wednesday, December 28–29, with the usual

morning and afternoon sessions on each day. The attendance included 86 members. President Frank Morley occupied the chair, relieved by G. D. Birkhoff, R. G. D. Richardson, and H. S. White. The following new members were elected: Professor L. M. Coffin, Coe College; Professor I. H. Fenn, Polytechnic Institute of Brooklyn; Dr. Ludwik Silberstein, Eastman Kodak Company; Dr. W. L. G. Williams, Cornell University. One hundred and twenty-one applications for membership were received.

At the annual election the following officers and other members of the council were chosen: President, G. A. Bliss; vice-presidents, F. N. Cole and Dunham Jackson; secretary, R. G. D. Richardson; treasurer, W. B. Fite; committee of publication, E. R. Hedrick, W. A. Hurwitz, J. W. Young; members of the council to serve until December, 1923, T. H. Gronwall, O. D. Kellogg, Florence P. Lewis, A. D. Pitcher.

The total membership of the society is now 769, including 87 life members. The total attendance of members at all meetings, including sectional meet- of papers read was 211. The number of members attending at least one meeting during the year was 280. At the annual election 189 votes were cast. The treasurer's report shows a balance of $8,994.53, including the life membership fund of $7,518.87. Sales of the society's publications during the year amounted to $2,067.74. The library now contains 5,862 volumes, excluding some 500 unbound dissertations.

At the meeting of the council, Professor T. S. Fiske, as representative of the contributors to the Bôcher memorial fund, tendered the fund to the society to be held in trust and the income to be employed for the advancement of mathematical science. The trust was accepted, and a committee appointed to consider the most appropriate use to which the income of the fund could be devoted.

A committee was appointed to make the necessary arrangements for the meeting of the society to be held at Wellesley College in the summer of 1921.

The afternoon session on Tuesday was especially marked by the retiring presidential address of Professor Frank Morley, on "Pleasant questions and wonderful effects." A dinner was held at the Faculty Club Tuesday evening at which fifty members were present.

At the close of the morning session on Wednesday, Professor H. S. White, in a short address, tendered the thanks of the society to Professor Cole for his distinguished services during his twenty-five years of office as secretary of the society and editor of its *Bulletin*.

The following papers were read at the annual meeting:

C. E. Wilder: "Einstein's four-dimensional space is not contained in a five-dimensional linear space."

J. L. Walsh: "On the convergence of the Sturm-Liouville series."

Anna M. Mullikin: "Certain theorems concerning connected point sets."

A. R. Schweitzer: "On homogeneous functions as generators of an abstract field."

A. R. Schweitzer: "The concept of an iterative compositional algebra."

Joseph Lipka: "Transformations of trajectories on a surface."

Harry Langman: "Conformal transformations of period n and groups generated by them."

O. E. Glenn: "On a new treatment of theorems of finiteness (second paper)." (Preliminary report.)

J. E. Rowe: "The efficiency of projectile and gun."

S. D. Zeldin: "On the structure of finite continuous groups with one two-parameter subgroup."

S. D. Zeldin: "On the structure of finite continuous groups with a finite number of exceptional infinitesimal transformations."

H. S. Vandiver: "On quadratic congruences and the factorization of integers."

E. V. Huntington: "A mathematical theory of proportional representation."

H. M. Morse: "Recurrent motions of the discontinuous type."

Frank Morley: presidential address: "Pleasant questions and wonderful effects."

Edward Kasner: "Properties of orbits in the general theory of relativity."

Edward Kasner: "The solar gravitational field in finite form."

Norbert Wiener: "The average of an analytic functional."

Norbert Wiener: "The average of a functional."

Norbert Wiener: "Further properties of the average of a functional."

Gillie A. Larew: "The Hilbert integral and Mayer fields for the problem of Mayer in the calculus of variations."

R. M. Mathews: "Generalizations of the classical construction of the strophoid."

W. A. Hurwitz: "Some properties of methods of evaluation of divergent sequences."

W. C. Graustein: "Parallel maps of surfaces."

J. H. M. Wedderburn: "On the maximum value of a determinant."

J. H. M. Wedderburn: "On the automorphic transformation of a bilinear form."

J. W. Lasley, Jr.: "Some special cases of the flecnode transformation of ruled surfaces."

R. G. D. Richardson: "The theory of relative maxima and minima of quadratic and hermitian forms and its application to a new foundation for the theory of bilinear forms. First paper: Equivalence of pairs of bilinear forms."

J. S. Taylor: "The analytic geometry of complex variables with some applications to function theory."

C. H. Forsyth: "The value of a bond to be redeemed ultimately, both principal and interest, in equal installments."

C. H. Forsyth: "Valuation of bonds bought to realize a specified rate of interest assuming the amortizations to accumulate at a savings bank rate."

Einar Hille: "Zeros of Legendre functions."

W. B. Carver: "Systems of linear inequalities."

J. L. Coolidge: "Differential geometry of the complex plane."

C. L. E. Moore: "Note on minimal varieties in hyperspace."

I. J. Schwatt: "Independent expressions for the Bernoulli numbers."

I. J. Schwatt: "Relations involving the numbers of Bernoulli and Euler."

I. J. Schwatt: "Independent expressions for Euler numbers."

I. J. Schwatt: "Independent expressions for the Euler numbers of higher order."

I. J. Schwatt: "Summation of a type of Fourier's series."

F. W. Owens: "On the projectivity assumption in projective geometry."

R. W. Burgess: "On certain simple skew frequency curves."

G. M. Robison: "Divergent double series and sequences."

G. D. Birkhoff: "An extension of Poincaré's geometric theorem."

J. L. Walsh: "On the location of the roots of polynomials."

Abstracts of the papers will appear in the March issue of the society's *Bulletin*.

The fifteenth western meeting of the society was held at Chicago on December 29–30, in connection with the meeting of the American Association for the Advancement of Science. The next regular meeting of the society will be held at New York on February 26.

R. G. D. RICHARDSON,
Secretary

THE AMERICAN ASTRONOMICAL SOCIETY

THE twenty-fifth meeting of the society was held in affiliation with the American Association for the Advancement of Science at the University of Chicago on December 28–30, 1920. In common with other societies there was a full attendance of members, about sixty astronomers being present, and there were many interesting and valuable papers. Sessions were held on three days in the Ryerson Physical Laboratory, but without doubt the most important astronomical communication was presented at the joint session with the American Physical Society and the Optical Society of America, when Professor A. A. Michelson announced the striking success of his interferometer as applied at Mt. Wilson in the direct measure of the diameter of the star α *Orionis*.

The members attended a joint dinner at the Quadrangle Club with the members of the mathematical societies, and there was the usual profitable intercourse with other men of science made possible at these large gatherings.

As this was not the annual meeting of the society, there were no particular matters of business to be considered. A dozen new members were elected, bringing the total membership to something more than three hundred and fifty.

Following are the titles of the papers, abstracts of which will be regularly published in *Popular Astronomy*.

Note on the comparison of spectral types determined at Harvard and Mount Wilson: W. S. ADAMS and A. H. JOY.

Evidence regarding the giant and dwarf division of stars afforded by recent Mount Wilson parallaxes: W. S. ADAMS and A. H. JOY.

Additional evidence on changes of wave-length which are progressive with stellar type: SEBASTIAN ALBRECHT.

Sun-spot intensities as components of a Fourier series: DINSMORE ALTER.

The association of hydrogen lines with the "invariable" K line in the spectrum of κ *Draconis:* R. H. BAKER.