inch Harvard telescope. All of these stars will be compared with the stars of the twelfth magnitude, whose absolute magnitudes will be determined with the 12-inch Harvard meridian photometer. Their relative brightness will also be determined more accurately with the Harvard 15-inch telescope. After the work is fairly started it is believed that it can be reduced to a simple routine, by which great results may be attained with a moderate expenditure. By the time this report is presented it is expected that observations with the Yerkes, Lick, University of Virginia and Harvard telescopes will be in progress.

Registration of Astronomers: By E. C. PICKERING.

A plan for the registration of astronomers desiring positions was proposed to the Society at its meeting at the Harvard Observatory in 1898. It was hoped that in this way suitable candidates could be found for vacant positions, and at the same time good positions could be found for those qualified for them. As however, the members present did not desire that the Society should undertake this work, it has been carried out by, and at the expense of, the Harvard College Observatory. Blanks of the form appended have been distributed, and during the last eight months, thirteen men and six women have applied for positions. Requests for assistants have been received from four institutions, but in only one or two cases were the vacancies filled. The number of candidates for positions is therefore abundant and it is hoped that institutions will avail themselves more freely of this register in filling positions. No charge is made either to institutions or individuals, and, if desired, communications are regarded as confidential.

GEORGE C. COMSTOCK,
Secretary.

(To be Concluded.)

AMERICAN MATHEMATICAL SOCIETY.

FOLLOWING its usual custom, the American Mathematical Society held its Seventh Summer Meeting in affiliation with the American Association for the Advancement of Science, at Columbia University, June 27th–29th. The Society is one of, at present, sixteen scientific bodies which have responded to the general invitation of the Association to meet simultaneously with it, their relation to the Association being described by the very flexible term 'affiliation.' These societies contribute greatly to the importance and interest of the meeting, frequently furnishing a large proportion of the total attendance and of the scientific output. In many cases a more intimate relation between them and the Association would be mutually beneficial, and plans for such a strengthening of ties are already under consideration. But, at present, the affiliated societies receive scanty official recognition. They have no representation in the councils of the Association; no official reception is given them at the meeting; they receive none of the general circulars of information issued by the Association; and the notices of the societies printed in these circulars have been, in at least one instance, unauthorized and incorrect. In short, the societies are left mostly to their own devices, and enjoy all the advantages and disadvantages of this condition.

The unusually early date of the meeting involved some conflict with the academic duties of many members, and reduced the period of preparation and accumulation of material from four to two months. But in spite of this and the uncomfortable weather, the occasion was a pronounced success. Fifty-six members of the Society were in attendance, a number which has never been exceeded. Professor Simon Newcomb, ex-President of the Society, presided at the opening of the first session, on Wednesday afternoon, and was succeeded in the chair

by Vice-President E. H. Moore, relieving President R. S. Woodward, who was also President of the Association. Professor H. S. White, Professor E. W. Hyde, and the Secretary were also called to the chair during the meeting. On Thursday, the Society met, for the first time in its history, in joint session with Section A, the entire day being devoted to this combined meeting. At the morning session, at which papers chiefly from Section A were read, Professor Ormond Stone presided. On Friday, separate sessions were resumed. The final session, on Friday afternoon, was devoted to an extensive discussion, noted below.

The Council announced the election of the following persons to membership in the Society: Mr. J. L. Coolidge, Harvard University; Professor Peter Field, Carthage College; Mr. F. A. Giffin, University of Colorado; Mr. W. J. Greenstreet, Stroud, England; Mr. L. L. Locke, Fredonia, Pa.; Professor J. E. Manchester, Vincennes University; Professor W. J. Vaughn, Vanderbilt University. Six applications for membership were reported. The present membership of the Society is 342. At the meeting of the Council it was decided to set apart the life membership fund, now amounting to $600, as a special fund for the promotion of such object as the Council may hereafter designate.

The following papers were read at this meeting:

(1) DR. A. S. CHESSIN: 'On the motion of a top, taking into account the rotation of the earth.'

(2) PROFESSOR F. MORLEY: 'On a mechanism for drawing trochoidal and allied curves.'

(3) MR. H. W. KUHN: 'Theorem on non-primitive groups' (preliminary communication).

(4) DR. H. E. TIMERDING: 'Some remarks on tetrahedral geometry.'

(5) PROFESSOR H. B. NEWSON: 'On singular transformations.'

(6) DR. VIRGIL SNYDER: 'On a special form of annular surface.'

(7) PROFESSOR F. MORLEY: 'On the rational quartic curve in space.'

(8) PROFESSOR PAUL GORDAN: 'Die Hesse'sche und die Cayley'sche Curve.'

(9) MR. H. E. HAWKES: 'On hyper-complex number systems.'

(10) PROFESSOR MAXIME BÔCHER: 'Application of a method of d'Alembert to the proof of Sturm's theorem of comparison.'

(11) MISS I. M. SCHOTTENFELS: 'On groups of order 8!/2.'

(12) PROFESSOR P. F. SMITH: 'On surfaces sibi-reciprocal under those contact transformations which transform spheres into spheres.'

(13) PROFESSOR E. H. MOORE: 'A simple proof of the fundamental Cauchy-Goursat theorem.'

(14) PROFESSOR W. F. OSGOOD: 'On the existence of the Green's function for simply connected plane regions bounded by a general Jordan curve, and for regions having a more general boundary of positive content.'

(15) DR. J. V. COLLINS: 'Quaternions and spherical trigonometry.'

(16) PROFESSOR J. MCMAHON: 'Kelvin's treatment of instantaneous and permanent sources extended to certain cases in which a source is in motion.'

(17) DR. F. R. MOULTON: 'Oscillating satellites.'

(18) MISS B. E. GROW: 'The reduction of binary quantics to canonical forms by linear transformation.'

(19) DR. M. B. PORTER: 'Note on geometry on the non-singular cubic.'

For the Friday afternoon session, a discussion of the following question was in order:

What courses in mathematics should be offered to the student who desires to devote one-half, one third, or one-fourth of his undergraduate time to preparation for graduate work in mathematics?

The discussion was opened by the following papers:

PROFESSOR E. H. MOORE: 'Certain fundamental ideas which should be emphasized throughout the undergraduate course.'

PROFESSOR J. HARKNESS: 'The importance of some preliminary training in applied mathematics'; 'Courses in differential calculus and differential equations.'

PROFESSOR W. F. OSGOOD: 'The proper time for he introduction of the lecture method'; 'Courses in differential equations'; 'Should elementary courses

in more advanced subjects be included in the undergraduate curriculum?'

PROFESSOR F. MORLEY: 'Certain phases of the general question.'

PROFESSOR J. W. A. YOUNG: 'Collegiate preparation for the teaching of mathematics in secondary schools.'

A general discussion of the subject then took place.

On each evening of the meeting, the members generally took advantage of the opportunity to dine together.

The next regular meeting of the Society will be held in New York on Saturday, October 27th.

F. N. COLE,
Secretary.

THE RELATION OF BIOLOGY TO PHYSIOGRAPHY.

THE studies of paleontologists have been among our chief sources of information concerning the physiography of various regions in past geologic periods. Far-reaching conclusions have been drawn from faunal resemblances and differences as to the relations of sea and land, the presence or absence of barriers and the direction of marine currents during particular epochs of the earth's history. It is evident that biology should bear a relation to physiography analogous to that which paleontology bears to paleophysiography. Some of the ways in which the two distinct sciences react upon each other have been pointed out by Woodworth,* and it is the purpose of the writers to call attention to a specific case in point where identical conclusions were reached quite independently by different investigators pursuing distinct lines of research.

These results are of the utmost importance in the particular problems upon which they bear, but their chief value at the present time lies in the fact that they bring physiography and biology upon common ground and show that each may and should receive assistance from the other.

In discussing the origin and recent history of the physical features of the southern Appalachians* in 1894 the writers advocated the theory that the upper Tennessee River formerly flowed into the Gulf of Mexico by way of the present Coosa and Alabama rivers, and that it was diverted to its present course through the Cumberland Plateau in the latter part of Tertiary {Neocene (?)} time. The former course of this river is shown on the accompanying outline map by the dotted line *A* which extends in the direction of the upper Tennessee from the vicinity of Chattanooga southwestward to the Coosa in eastern Alabama.

This theory was again advocated by the senior author† in 1897–98, and the evidence in its support was presented in somewhat greater detail. The conclusions in both reports were based entirely upon physiographic evidence—such as the character of the Tennessee—Coosa divide, the newness of the gorge below Chattanooga and the general arrangement of the drainage lines.

We recently learned with considerable surprise and gratification that Mr. Charles T. Simpson, of the Smithsonian Institution, had independently reached the same conclusion from a study of the fresh water mollusca contained in the rivers in question.

In an equally unexpected manner Mr. Simpson has corroborated the conclusions of the junior author‡ regarding the changes which have taken place in the head branches of the Coosa, Chattahoochee, and Savannah rivers.

The conclusion that the Etowah River had been robbed by the Chattahoochee

* J. B. Woodworth, 'The Relation Between Base-leveling and Organic Evolution,' *Am. Geol.*, Vol. XIV., pp. 209–235, 1894.

* Geomorphology of the Southern Appalachians: *Nat. Geog. Mag.*, Vol. VI., pp. 63–126, May, 23, 1894.

† Physiography of the Chattanooga District. 19th Ann. Rept., U. S. Geol. Survey, Part II., pp. 1–58.

‡ Drainage Modifications and their Interpretation. *Jour. Geol.*, Vol. 4, pp. 567–581 and 657–673.