zone and about 600 zero and azimuth stars have been ob-
served.

For a working list the card system has been used with great
satisfaction. A card is devoted to each star, with a space for
the results of observation. In arranging the cards for an
evening's work, slips are inserted to indicate the time for
reading meteorological instruments and for lunch.

Fifty to sixty stars are observed per hour. The programme
requires two accordant observations of each zone star. The
observations are entirely differential and are founded upon a
list of 303 zero stars.

No. 10 was an account of the work of reduction of the data
of Gilliss upon the positions of stars in the southern hemi-
sphere. The author described the difficulties encountered by
the observer from poor equipment and insufficient support.

Among the errors of observation were the recording of one
cross wire for another, and use of the telescope when its cross
wires were oblique, the error thus arising being attributed to
refraction.

Mr. J. A. Brashear of Allegheny, Pa., exhibited a concave
grating with 15,000 lines to the inch, ruled on Professor
Rowland's new ruling-machine.

The place of the next annual meeting will probably be San
Francisco, although no final decision was reached, followed
by a meeting at Buffalo in 1896. The President of the next
meeting will be E. W. Morley, Cleveland, Ohio.

The officers of section A chosen for 1895 are: E. S. Holden,
Mt. Hamilton, Cal., Vice-President, and E. H. Moore, Chicago,
Ill., Secretary.

COLUMBIA COLLEGE.   E. M. BLAKE.

NOTES.

THE meeting of the British Association for the Advance-
ment of Science was held this year at Oxford, beginning on
August 8 with the presidential address by Lord Salisbury.
The attendance was exceptionally large, many eminent foreign
scientists being present, and a number of papers of high im-
portance was read. The University expressed its appreciation
of the presence of so many distinguished foreigners by confer-
ring the honorary degree of D.C.L. upon some twelve of
them, among whom was Professor Gosta Mittag-Leffler. On
Thursday, August 9, a soirée and exhibition of scientific ap-
paratus was held in the University Museum. Among the
exhibits was a series of linkage models by Professor Henrici.
On Friday the section of mathematics and physics held a joint
session with the section of mechanics, and several discussions

were engaged in, one of the most interesting being on "Integrators, harmonic analysers and integraphs, and their application to physical and engineering problems."

THE courses in pure mathematics announced at the University of Berlin for the semester beginning October 15 include the following: Fuchs, Linear differential equations, Elliptic functions—Frobenius, Theory of algebraic equations—Schwarz, Synthetic conic sections, Integral Calculus, Calculus of variations—Hensel, Theory of numbers, Theory of algebraic integrals—Hettner, Fourier's series—Knoblauch, Curved surfaces, Twisted curves, Differential calculus—Schlesinger, Theory of definite integrals. T. S. F.

THE first and second sections of the French Association for the Advancement of Science at the Caen Congress, in their session of August 14, 1894, when the order of the day was, a study of means to insure a more facile and fruitful exchange of views between mathematicians of different nations, and thus to contribute to the progress of mathematics and the perfecting of its methods, passed unanimously the following resolutions, after a thorough discussion, joined in by many members:

1. We give our most complete adherence to the plan for creating *international mathematical congresses,* and declare ourselves disposed to bear all aid to the efforts making or to be made toward this end.

2. We approve absolutely the idea of Mr. Mansion, relative to the making of *mathematical vocabularies,* and applaud the beginning of its realization already accomplished by Commandant Brocard in the preparation of a French mathematical vocabulary.

3. We express the hope that the project of Mr. Jacques Boyer concerning the establishment of a *mathematical dictionary* may come to a happy issue, both in France and in many other countries.

4. We believe we should draw attention to the remarkable mathematical monographs being published at this moment in Germany, and of which it would be very desirable to see published translations into divers languages.

5. We consider that the great efforts made by Professor Peano and many of his confrères for the propagation of *algorithmic logic* and the publication of a *mathematical formulary* are of a nature to contribute powerfully to the end we seek to attain.

6. We are happy to state the degree of advancement of the *Répertoire Bibliographique des Sciences Mathématiques,* and, in the same order of ideas, to applaud the highly interesting publication due to a group of mathematicians in Holland,

particularly Mr. P. H. Schoute, which is entitled *Revue Seme-strielle des Publications Mathématiques.*

7. We think that the publication of *l'Intermédiaire des Ma-thématiciens,* since the beginning of 1894, has rendered and will render very great services in what concerns the relations of mathematicians to each other; we express our gratitude to the founders, Laisant and Lemoine, and felicitate ourselves that this initiative was due to two members of the French Association for the Advancement of Science.

8. We take into very serious consideration the reflections presented by Mr. Lémeray on the possibility of establishing mathematical libraries, having for object to put books at the disposal of workers remote from scientific centres.

9. We decide that the question, under the general form which has been given it, shall be retained as the order of the day for sessions at the Bordeaux meeting in 1895.   G. B. H.

THE Prince Jablonowski Society of Leipzig makes the following announcements in regard to prizes in the department of mathematics and natural science:

For 1894.—The determination afforded by Leverrier of the secular perturbations of orbits, in the case of the inner planets particularly, gives unsatisfactory results, inasmuch as the terms of the second order cannot be used in the calculations, they being inexact and occasionally even greater than the terms of the first order. This difficulty, which in its consequences seems to be related to certain anomalies in the motion of Mercury relative to its perihelion, Leverrier* was inclined to attribute to the method of treatment adopted, by which in the first approximation the differential equations of the problem were considered as linear. The society desires accordingly *a new determination of the secular perturbations of at least the orbits of Mercury, Venus, the Earth, and Mars, having regard to the terms of higher order,* the methods employed to be free from objections, and the difficulties encountered by Leverrier, which would destroy the utility of the results, to be removed.

For 1897.—The methods which Monge, Ampère, and Darboux have furnished for integrating partial differential equations of the second and higher orders are applicable only to those equations which have in common with other equations solutions dependent not merely upon arbitrary constants. On the other hand it follows from Lie's investigations upon infinite groups that equations which admit an infinite group of contact transformations, in general, bear to other equations the relation just described (involutorial rela-

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* Recherches astronomiques, chap. IX, art. 16, and Additions III, p. 51.

tion).* The society desires *that the methods of integration resulting from this remark should be developed, and should be illustrated to as great an extent as possible by instructive examples fully worked out.*

The prizes are of 1000 marks each. Papers offered in competition will be received by the secretary of the society until November 30 of the year indicated. The results will be announced in the following March or April.

PRINCE BALDASSARE BONCOMPAGNI, for many years editor of the *Bulletino di Bibliografia e di Storia delle Scienze matematiche e fisiche,* died at an advanced age in Rome on April 12 last.

HERMANN LUDWIG FERDINAND BARON VON HELMHOLTZ died in Berlin on September 8, at the age of seventy-three years. T. S. F.

NEW PUBLICATIONS.

I. HIGHER MATHEMATICS.

ANTILOTTI (F.). Trattato di analisi algebrica. Parte I : Analisi algebrica elementare. Napoli, 1893. 8vo. 9 and 308 pp.

ARCAIS (F. D'). Corso di calcolo infinitesimale. Vol. II : Calcolo integrale. Padova, 1894. 8vo. Fr. 11.00

ARCHILLA (S.). Principios fundamentales del cálculo diferencial. 2a edición. Madrid, 1894. 4to. 16 and 227 pp. Fr. 10.00

ARNOUX (G.). Essais de psychologie et de métaphysique positives. Arithmétique graphique. Les espaces arithmétiques hyperma giques. Paris, Gauthier-Villars, 1894. 8vo. 24 and 176 pp. 1 colored plate. Fr. 6.00

ASCHIERI (F.). Geometria proiettiva del piano et della stella. 2a edizione, corretta ed ampiata del Manuale di geometria proiettiva. Milano, Hoepli, 1894. 16mo. 6 and 228 pp. Illustrated.

BACHMANN (P.). Zahlentheorie. Versuch einer Gesammtdarstellung dieser Wissenschaft in ihren Haupttheilen. In 6 Theilen. 2ter Theil : Die analytische · Zahlentheorie. Leipzig, Teubner, 1894. 8vo. 18 and 494 pp. Mk. 12.00

BERNOULLI (J.). See STÄCKEL.

BIANCHI (L.). Lezioni di geometria differenziale. Parte II. Pisa, 1894. 8vo. pp. 257–544. The whole work Fr. 20.00

BOREL (E.). Sur quelques points da la théorie des fonctions. [Thèse.] Paris, Gauthier-Villars. 1894. 4to. 53 pp. Illustrated. Fr. 5.00

BRUNS (H.). Ueber die Ableitung des mittleren Fehlers. Leipzig, 1894. 4to. 17 pp. Mk. 1.60

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* DARBOUX, *Journal de l'école normale,* 1870.
 LIE, *Berichte der sächsischen Gesellschaft der Wiss.,* 1891–94.