discover in a few moments the title of an authoritative work on the birds of British Guiana or the fishes of Zanzibar?

The volume, of quarto size, is divided into three parts. In the first of these, a running commentary of 146 pages on the history of the literature of vertebrate zoology from the time of Aristotle down to the present, the author has achieved the remarkable feat of being so interesting that one may open at any page and find himself immediately engrossed in the text. Dr. Wood has brought to his task a freshness of style and a conciseness of expression which must be the envy of all reviewers, as it is of the present writer. Such subjects are included as early Greek, Roman and Oriental zoologists, medieval writers on zoology, the Renaissance and its effect on zoological writings, the literature of comparative zoology, forerunners, contemporaries and successors of Linnaeus, animal painters and illustrators, zoological gardens and museums, travelogues of explorers, and other topics too numerous to mention. The reader who wishes to orient himself in the general literature of vertebrate zoology will find here a veritable treasure-house of information.

The second portion of the work consists of a classified index to authors of treatises on different groups of vertebrates and different geographical areas, so arranged that one may find in a moment a selected group of references on, say, the fishes of Europe or the mammals of South Africa.

Having located in this way the name of an author of a standard reference on the subject in question, one turns next to the third portion of the volume, which consists of a partially annotated catalogue of the titles on vertebrate zoology in the McGill University Libraries. Here he will find the detailed citation of the work he desires to consult, with, in many cases, a note regarding the nature of the treatise which may indicate its probable usefulness.

While the work is obviously of greater value to persons having access to the libraries of McGill University than to any one else, nevertheless its general utility is so great that no library of zoology can afford to be without it. Although he who consults the volume in quest of the literature dealing with his own particular specialty is likely to be disappointed by the omissions he will discover, on the other hand, any one wishing to become acquainted with the literature of a portion of the vertebrate field with which he is unfamiliar will bless Dr. Wood for the care and labor he has expended in smoothing the way.

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SOCIETIES AND MEETINGS

THE INTERNATIONAL CONGRESS OF MATHEMATICIANS, ZURICH, SEPTEMBER 4–12, 1932

IF any evidence were needed of the rapid development of mathematics in the last third of a century it might well be found in a study of the programs of the several sections of this Congress and of the number and nature of the papers read. In the early years of these quadrennial meetings four sections were considered sufficient; at present there are twice as many. At first the countries represented were chiefly European, the number of members from other continents being relatively small; but in this congress between 40 and 50 nations were represented and the attendance approximated 650 men and 200 women. Of the latter, several were on the mathematical staffs of various American colleges, most of the others being associate members incidentally visiting the congress. The United States and Canada were represented by between 65 and 70 mathematicians and about 25 associates, between 20 and 30 reports or papers being listed.

The congress was divided as usual into two kinds of meetings, six forenoons being occupied by general sessions, at which 22 lectures on new phases of advanced mathematics were given, and four afternoons being devoted to section meetings. There were eight of these sections as follows: I. Algebra and the Theory of Numbers; II. Analysis (three subsections); III. Geometry (two subsections); IV. Probability, Statistics, Insurance; V. Astronomy and Technical Mathematics; VI. Mechanics and Mathematical Physics; VII. Philosophy and History; VIII. Education.

The papers listed in the various sections, not all of which were read, numbered 268. Certain minor changes were made in the programs of the various sessions, and the lists given below are based chiefly upon the latest information supplied by the official bureau.

Each paper was written in one of the four international languages recognized by the congress—English, French, German and Italian. In general the contributors from countries speaking other languages (such as Holland, Russia, Greece, Portugal, the Balkan states, Scandinavia and South America) prepared their papers in French or in German. The fact, therefore, that an address was given in French, for example, does not signify that it was of French origin. There is some value, however, in observing the languages in which current mathematical investigations

are made known, and hence the following table has been prepared to show their distribution in the papers of the various sections mentioned above:

Sections	I	II	III	IV	V	VI	VII	VIII	Totals
French	6	44	17	5	3	28	4	5	112
German	13	24	23	8	5	14	6	2	95
English	6	12	7	2	1	3	2	4	37
Italian	1	11	4	2	0	5	1	0	24
	26	**91**	**51**	**17**	**9**	**50**	**13**	**11**	**268**

The fact that the congress was held in a trilingual country, although one in which French and German predominate, must be considered in drawing conclusions from this table, as must also other geographical factors.

The interests manifested in the several sections, as shown by the respective number of papers, is more significant. For example, it will be seen that Section II. (analysis, with three subsections) leads with 91 papers; Section III (geometry, with two subsections) and Section VI (mechanics and mathematical physics) come next with 51 and 50 papers respectively, while Section I (algebra and the theory of numbers) follows with 26 papers, and Section IV (probability, statistics, insurance) with 17. The other sections have 13 or less.

Although it is to be expected that the countries adjacent to Switzerland would be more fully represented than those at a greater distance, there is some significance in the geographical distribution of the papers. For this reason a table has been prepared showing the number of authors or co-authors of papers listed under each country represented in the official bulletins. It should be understood, however, that a number of the writers were absent and that some of their papers were not presented. There were also a few slight errors in the official statements owing to the confusion of the names of contributors or of places. Nevertheless, the following table shows approximately the number of writers of papers listed in the several sections as belonging to the various countries represented:

Germany	46	Great Britain	10
France	38	Poland	9
Italy	28	Jugoslavia	6
America*	23	Austria	6
Switzerland	18	Holland	5
Russia	15	Norway	4
Czechoslovakia	11	Sweden	4

All others, 23, ranging from 1 to 3.

* The term "America" includes the United States and Canada.

It will be observed that the four leading countries were Germany (46), France (38), Italy (28) and America (23), but several other items will also attract attention, such as the number of contributors from Russia (15), Czechoslovakia (11), and Poland (9) and the relatively small number from Great Britain and the other states of the British Commonwealth. As to Russia there has been a rather popular feeling in other countries that she is concerned only with the immediate applications of mathematics to the industrial field. It is therefore interesting to observe that most of the papers read by the Russian contributors were in the domain of abstract analysis, eleven being devoted to this subject, two to technical mathematics, four to mechanics and physics, two to geometry, one to probability and statistics, and one to number theory, philosophy, history or teaching. The number of papers is manifestly too small to render possible any definite conclusions as to the range of Russian interest in mathematics, but it is sufficient to show that the subject is not looked upon by the Soviet states as merely utilitarian in the narrow sense.

It is impossible in a report so limited as this to give any satisfactory résumé of nearly 300 lectures or papers, or even to mention more than a few titles. Two lists have therefore been prepared, the first giving the titles of the lectures listed in the general program, and the second the titles of section papers by Americans.

The first of these lists, important as bearing upon the general trend of higher mathematics at the present time, is as follows:

R. FUETER: Idealtheorie und Funktionentheorie.

C. CARATHÉODORY: "Über die analytischen Abbildungen durch Funktionen mehrerer Veränderlicher."

G. JULIA: "Essai sur le Développement de la Théorie des Fonctions De variables complexes."

W. PAULI: "Mathematische Methoden der Quantenmechanik."

N. TSCHEROTARÖW: "Die Aufgaben der modernen Galois'schen Theorie."

T. CARLEMAN: "Sur la Théorie des Équations intégrals linéaires et ses Applications."

E. CARTAN: "Sur les Espaces riemanniens symétriques."

L. BIEBERBACH: "Operationsbereiche von Funktionen."

M. MORSE: "The Calculus of Variations in the Large."

E. NOETHER: "Hyperkomplexe Systeme in ihren Beziehungen zur kommutativen Algebra und zur Zahlentheorie."

H. BOHR: "Fastperiodische Funktionen einer komplexen Veränderlichen."

F. SEVERI: "La Théorie générale des Fonctions analytiques de plusieurs Variables et la Géométrie algébrique."

R. NEVANLINNA: Über die Riemannsche Fläche einer analytischen Funktion."

R. WAVRE: "L'aspect analytique du Problème des Figures planétaires."

J. W. ALEXANDER: "Some Problems in Topology."

F. RIESZ: "Sur l'Existence de la Dérivée des Fonctions d'une Variable réelle et des fonctions d'intervalle."

G. H. HARDY: "Recent Work in Additive Theory of Numbers."

G. VALIRON: "Le Théorème de Borel-Julia dans la Théorie des Fonctions méromorphes."

W. SIERPINSKI: "Sur les Ensembles de Points qu'on sait Définir effectivement."

S. BERNSTEIN: "Sur les Liaisons entre quantités aléatoires."

K. MENGER: "Neuere Methoden und Probleme der Geometrie."

J. STENZEL: "Anschauung und Denken in der klassischen Theorie der griechischen Mathematik."

As to the papers listed in the various sections it will doubtless be of interest to American readers to be informed concerning the nature of those contributed by the United States and Canada. While it is not feasible to give the titles in full, much less to give any summaries of the papers themselves, the general topics as listed (a few of the papers not being read) are as follows:

C. R. ADAMS, Providence: "Definitions of Bounded Variations for Functions of Two Variables."

J. A. CLARKSON, Providence, collaborator in the preceding paper.

ELIZ. B. COWLEY, Pittsburgh; "Vocabularies in Geometry."

LOUISE CUMMINGS, New York: "Comparison of Straight-line Nets."

L. L. DINES, Saskatoon: "On Linear Inequalities."

S. GANDZ, New York: "On Alphabetic Numerals." Read by D. E. Smith.

O. E. GLENN, Lansdowne, "Mechanics of the Stability of a Central Orbit."

E. HILLE, Princeton: Two papers with J. D. TAMARKIN (Providence) on the summation of Fourier series.

T. R. HOLLCROFT, New York: "General Web of Surfaces."

EDW. KASNER, New York: (1) "Conformity in Connection with Functions of Two Variables"; (2) "Curvative Theorems in Dynamics"; (3) "Element Transformations of Space for which Normal Congruences of Curves are Invariant"; (4) "Conformal Geometry in the Complex Domain."

E. C. MOLINA, New York: "Expansion for Laplacian Integrals in Terms of Incomplete Gamma Functions."

O. ORE, New Haven: "Non-commutative Polynomials."

C. N. MOORE, Cincinnati: "Properties of Fourier Constants."

R. E. A. C. PALEY, Cambridge: See Wiener, *infra*.

G. Y. RAINICH, Ann Arbor: "Determination of Matter and Force Components, Riemann Tensor."

D. E. SMITH, New York: "On the Work of the International Commission on the Teaching of Mathematics." See also Gandz, *supra*.

J. J. SMITH, Schenectady: "Expression for Green's Function in Generalized Coordinates."

V. SNYDER, Ithaca: "Cremona Involutions Defined by a Pencil of Ruled Surfaces."

E. B. STOUFFER, Lawrence: "Projective Differential Geometry of Developable Surfaces."

J. L. SYNGE, Toronto: "Equilibrium of a Tooth with Conical Root."

J. D. TAMARKIN, Providence: See Hille, *supra*.

N. WIENER, Cambridge: "Analytic Properties of the Characters of Infinite Abelian Groups." (In collaboration with R. E. A. C. Paley.)

That America should have ranked so high in the number of papers read, as well as in the number of members present, would have been anticipated by only a few optimistic scholars at the opening of the present century. That these papers would have generally been of such a high grade would hardly have been thought possible.

As has been the case in other congresses, beginning with the one held at Rome in 1908, the section on education was devoted chiefly to the work of the International Commission on the Teaching of Mathematics. The leading events were the brief address by the retiring president and a report by Professor Loria (Genoa) on the mathematical preparation of teachers of secondary mathematics in the various countries represented at the congress. Owing to financial conditions, not all the national reports were completed, but it is expected that all the material will soon be ready for publication. One of the most elaborate reports appears to be that of the United States, prepared by a national committee, consisting of Professors Hedrick (*chairman*), Reeve, Luse, Young (deceased), Frazier and Sueltz, which will probably be completed before the close of the present year, extracts having been read by Professor Loria. The following officers were elected for the next four years: *President,* J. Hadamard, Paris; *Vice-presidents,* P. Heegard, Oslo, G. Scorza, Naples, and W. Lietzmann, Göttingen; *Secretary-treasurer,* H. Fehr, Geneva. These were constituted a central committee with powers to elect other members and national committees. On the motion of Professor Hadamard, the retiring president, D. E. Smith, of New York, was elected honorary president for life. The topic for investigation for the next four years is, "The Present Trend of Mathematics in the Various Countries of the World."

The congress was unable to provide for the publication of the papers read in the sections, but in the second part of its *Proceedings* brief summaries of

most of them will be printed. The general lectures will appear in the first part. Summaries of most of the section papers were distributed to members of the congress, but with numerous omissions, the manuscripts not reaching Zurich in time to be included.

The social features were well arranged. They included a reception on September 4, a concert on September 5, an excursion on the lake on September 6, a social gathering at the Municipal Theater on September 10, and a tea on September 11. The ladies of Zurich made a great effort to provide entertainment for the women guests in the way of teas, visits to the town and its museums, and a motorcar excursion to the Castle of Wildegg. There were also excursions at a moderate price to Klausenpass, the Rigi, Pilatus, the Lake of the Four Cantons and the Jungfraujoch. For the official delegates there was a special tea-party given at the beautiful château of Herr and Frau von Schulthess-Bodmer at Au.

There was a small exhibition of books and mathematical instruments in the Polytechnic School, generally of recent material, but in one case, by L'Art Ancien, of old books and manuscripts.

In spite of the general world depression, the attendance was satisfactory, although not as large as at some of the other congresses. It is expected that the next meeting will be held in 1936 at Oslo.

DAVID EUGENE SMITH

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

GENERAL LECTURES AT ATLANTIC CITY

FOR each meeting the association endeavors to arrange a series of general lectures to be delivered in non-technical language. These lectures are given in a semi-popular style, so that they can be easily understood by scientists who are not specialists in the field of work treated in the lecture and by the general educated public. Many of the points of the speakers are brought out by illustrations. Some speakers use lantern slides, some use motion pictures, and some even use research apparatus to demonstrate their points. On the other hand, many of the general addresses are of such a nature that they do not require illustration.

The association has been extremely fortunate in being able to secure an unusually representative series of lectures for the Atlantic City meetings. Eminent speakers have promised to discuss subjects in anthropology, mathematics, chemistry, physics, botany, zoology, meteorology, astronomy, sociology, dentistry and engineering. Some of the lectures will be held in the evenings, but most of them will be scheduled for 4:30 or 5:00 P. M. after the technical sessions of the societies.

Dr. Franz Boas, retiring president of the association, will give the first general evening lecture on Tuesday, December 27, at 8:45 P. M. in the Ballroom of the Municipal Auditorium, on "Anthropology and Its Aims." Following Dr. Boas' lecture, members of the association and friends will gather in the Rutland Room of Haddon Hall, the association's general headquarters hotel, for the general reception, which will begin at 10:15 P. M.

The second evening lecture will be given under the auspices of the Society of the Sigma Xi at a joint session of the association in the Ballroom of the Municipal Auditorium.

Dean Dexter S. Kimball, of the Engineering College of Cornell University, will deliver the third evening lecture on Thursday, December 29, in the Ballroom of the Municipal Auditorium. Dean Kimball has announced his title as "The Social Effects of Mass Production." This subject, which ought to be of interest to every one and especially to engineers and sociologists, is one to which Dean Kimball has for several years devoted serious thought.

A new general lecture has been established in memory of the late Hector Maiben, of Lincoln, Nebraska. The lecture will deal authoritatively with a topic of active scientific interest upon which the speaker possesses the right to an opinion in virtue of his own work. It will, however, be addressed to a general scientific audience rather than to specialists. The first Maiben Lecture will be given in the Ballroom of the Municipal Auditorium by Dr. Henry Norris Russell, of Princeton University, on "The Constitution of the Stars." Dr. Russell will review the recent work of Eddington, Jeans, Vogt, Milne and others, and will report on the present status of the problem.

The first of the afternoon general lectures will be given by Dr. O. H. Caldwell, editor of *Electronics* and formerly U. S. Radio Commissioner, on Tuesday, December 27, at 4:30 P. M. in Committee Room 12 of the Municipal Auditorium. Dr. Caldwell has chosen the subject "Electrons at Work."

On Wednesday afternoon at 4:30 P. M. in Committee Room 13, Municipal Auditorium, Dr. Carl Caskey Speidel, of the University of Virginia, will deliver a general address on "Nerve Growth and Repair." Dr. Speidel plans to illustrate his address with lantern slides and a motion-picture film, giving a record of nerve activities. It will be recalled that Dr. Speidel was awarded the association's prize of $1,000 at New