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MSS. intended for publication and books, etc., intended for review should be sent to the Editor of SCIENCE, Garrison-on-Hudson, N. Y.

DOCTORATES CONFERRED BY AMERICAN UNIVERSITIES

THE universities of the United States have this year conferred the degree of doctor of philosophy[1] on 437 candidates, a considerable increase over the number in any preceding year. In the ten-year period from 1898 to 1907 the average number was 272.4, in the four last years the numbers have been 378, 389, 358 and 437. About 50 Americans receive annually the degree of doctor of philosophy or its equivalent abroad, and about three fourths of those who carry forward scientific research hold the degree. The writer has compiled data, not yet published, which show that about three fourths of those who receive the doctor's degree in science continue to do scientific work. From these figures it appears that about four hundred a year are added to those engaged in scientific and scholarly work. This is a small number compared with those who enter other professions, but it is at all events gratifying that it has about doubled since the publication of

[1] Including two doctorates of science, one at Harvard and one at New York, and two doctorates of engineering, one at the Massachusetts Institute and one at the Ohio State. The latter degree may be desirable, the former is not. When 239 degrees are given in the natural and exact sciences it is rather absurd to call 237 of them doctorates of philosophy and two doctorates of science. At Harvard the doctorate of philosophy does not mean that the candidate has studied Latin in the secondary school, but the doctorate of science means that he has not. In the interests of consistency the degree of master of science was established several years ago at Harvard, but it was soon abandoned. The doctorate of science should be permitted to follow it.

these statistics was begun fourteen years ago.

The 75 degrees from Columbia is the largest number hitherto conferred by any American institution and places this university first in the total number of doctorates given in the past fourteen years. Chicago follows closely, with 545 degrees, 10 fewer than Columbia, and is followed by Harvard, Yale, Johns Hopkins, Pennsylvania and Cornell, the decrease being in each case in the neighborhood of fifty degrees. These seven universities are responsible for about three fourths of the degrees conferred. Among state universities, Wisconsin and Illinois have maintained the position which they have recently acquired, having granted this year, respectively, 15 and 11 degrees, as compared with six from Michigan and the same number from California. During the ten-year period beginning in 1898, Chicago, Harvard, Columbia, Yale and Johns Hopkins conferred nearly the same number of degrees, varying from 356 at Chicago to 305 at the Johns Hopkins. In the course of the past four years Columbia has taken a decided lead, while Cornell and Pennsylvania have passed the Johns Hopkins and approach Yale. The figures are: Columbia, 233; Chicago, 189; Harvard, 157; Yale, 134; Cornell, 125; Pennsylvania, 116; Johns Hopkins, 106. The standards maintained by these universities are not the same. The percentages of the doctors who took their degrees prior to 1906 in the natural and exact sciences attaining the standard of scientific recognition indicated by the asterisks in the "Biographical Directory of American Men of Science" are: Harvard, 37; Johns Hopkins, 34; Chicago, 27; Cornell, 22; Columbia, 20; Yale, 19; Pennsylvania, 8. It should, however, be noted that the superior records of Harvard and the Johns Hopkins are in part due to the fact that they gave a relatively larger number of degrees at an earlier period.[2]

The number of doctorates conferred in the natural and exact sciences is increasing more rapidly than in other subjects. Prior to 1908 the average number of degrees conferred in the sciences was 124, as compared with 148 in the other group; in the three following years the average numbers were 186 and 189, respectively; this year the numbers were 239 and 198. As shown in Table II., Chicago is the university which has conferred the largest number of degrees in the natural and exact sciences, followed by the Johns Hopkins and Columbia. Of the degrees conferred at Cornell, 64 per cent. have been in the sciences, at the Johns Hopkins 58 per

[2] The report of the commissioner of education gives annually the number of doctorates of philosophy conferred by American universities, and as it is printed later than the report in SCIENCE it might be assumed to be more complete and accurate. This, however, appears not to be the case. In the report for 1910 St. Louis University is reported as giving 17 doctorates of philosophy and Grove City College 6. The degrees attributed to St. Louis University were an error, no doctorates of philosophy having been conferred. Grove City College may have had a legal right to confer this degree, but according to the same report of the commissioner of education it has no graduate students and its total endowment is $25,000. In answer to an inquiry the president of this college writes: "In reply to your esteemed favor would say, that the six doctorates to which you refer were conferred by Grove City College upon men who had previously received their bachelor degrees and who had given two years and more to the prescribed courses of study in philosophy maintained by this institution and in addition, two full summers in residence under my personal instruction, as well as that of Professor Ormond, of Princeton, and Professor John E. Clarke, of the Boston University. Some of these also had taken a course at Grove City under the late Borden P. Bowne, who assisted me in this work for some twelve or fourteen years. Any further information desired will be promptly forwarded."

TABLE I

Doctorates Conferred

	Average of 10 Yrs. 1898–1907	1908	1909	1910	1911	Total for 14 Yrs. 1898–1911
Columbia	32.2	55	59	44	75	555
Chicago	35.6	54	38	42	55	545
Harvard	33.8	42	38	35	42	495
Yale	31.8	32	44	27	31	452
Johns Hopkins	30.5	28	27	23	28	411
Pennsylvania	22.5	32	29	26	29	341
Cornell	18.1	22	34	35	34	306
Wisconsin	8.6	17	16	18	15	152
Clark	8.7	11	9	14	16	137
New York	6.7	15	13	11	17	123
Michigan	6.9	4	13	7	6	99
Boston	4.4	11	13	6	13	87
California	3.3	4	10	6	6	59
Princeton	2.6	6	4	8	9	53
George Washington	2.8	3	4	4	5	44
Virginia	2.8	4	1	4	2	39
Bryn Mawr	2.1	4	2	5	5	37
Illinois	.5	5	4	12	11	37
Minnesota	2.4	3	5	1	2	35
Brown	2.3	2	5	1	4	35
Catholic	2.0	1	3	3	5	32
Stanford	1.4	2	3	5	4	28
Nebraska	2.0	2	2	1	0	25
Iowa	1.1	2	0	4	3	20
Cincinnati	.3	0	2	2	5	12
Massachusetts Inst.	.3	3	0	3	2	11
Missouri	.4	3	0	2	2	11
Georgetown	1.0	0	0	0	0	10
Vanderbilt	.6	1	1	2	0	10
Washington	.7	1	0	0	2	10
Indiana	.0	3	3	0	2	8
Ohio	.4	0	2	0	2	8
Pittsburgh	.1	4	0	2	1	8
Kansas	.3	0	0	3	1	7
Syracuse	.2	0	2	1	2	7
Colorado	.5	0	1	0	0	6
North Carolina	.5	0	1	0	0	6
Northwestern	.4	0	1	0	1	6
Tufts	.5	0	0	1	0	6
Washington and Lee	.4	1	0	0	0	5
Lafayette	.3	0	0	0	0	3
Dartmouth	.1	1	0	0	0	2
Lehigh	.2	0	0	0	0	2
Tulane	.1	0	0	0	0	1
Total	272.4	378	389	358	437	4,286

TABLE II

Doctorates Conferred in the Sciences

	Average of 10 Years 1898–1907	1908	1909	1910	1911	Total for 14 Years 1898–1911	Per Cent.
Chicago	16.4	37	20	24	35	280	51
John Hopkins	16.8	17	20	15	19	239	58
Columbia	13.4	21	23	11	29	218	39
Harvard	14.1	13	14	10	20	198	40
Cornell	10.4	15	24	27	27	197	64
Yale	12.4	16	27	12	15	194	43
Pennsylvania	9.0	18	13	12	10	143	42
Clark	7.7	11	8	14	16	126	91
Wisconsin	2.8	6	4	13	13	64	42
California	2.4	2	6	4	5	41	70
Michigan	2.8	1	5	1	3	38	39
George Washington	1.7	2	2	3	4	28	64
Princeton	1.1	3	3	2	5	24	45
Brown	1.2	2	2	1	3	20	59
Illinois	.3	0	2	9	6	20	54
Stanford	1.1	2	2	1	4	20	71
Nebraska	1.3	1	2	1	0	17	68
Bryn Mawr	1.0	1	0	2	1	14	38
Virginia	1.1	2	0	1	1	15	39
Minnesota	.7	1	2	1	2	13	37
New York	.6	1	3	2	1	13	11
Massachusetts Inst.	.3	3	0	3	2	11	100
Iowa	.7	0	0	2	1	10	50
Washington	.7	1	0	0	2	10	100
Missouri	.3	2	0	2	2	9	82
Catholic	.5	—	2	0	1	8	25
Indiana	.0	3	3	0	2	8	100
Ohio	.4	0	2	0	2	8	100
Cincinnati	.1	0	1	1	4	7	58
Kansas	.3	0	0	3	1	7	100
Tufts	.5	0	0	0	0	5	83
Vanderbilt	.3	1	1	0	0	5	50
North Carolina	.3	0	1	0	0	4	67
Northwestern	.2	0	1	0	1	4	67
Washington and Lee	.3	1	0	0	0	4	80
Syracuse	.1	0	0	1	1	3	43
Boston	.1	0	1	0	0	2	2
Colorado	.2	0	0	0	0	2	33
Dartmouth	.1	1	0	0	0	2	100
Lehigh	.2	0	0	0	0	2	100
Pittsburgh	—	—	—	1	1	2	25
Georgetown	.1	0	0	0	0	1	10
Lafayette	.1	0	0	0	0	1	33
Total	124.1	184	194	179	239	2,037	48

cent., at Harvard 40 per cent., at Columbia 37 per cent. It is somewhat curious that the percentages at Wisconsin, Michigan, Illinois and Minnesota, should be as small as 42, 39, 54 and 37, respectively, as it is the general impression that the sciences are especially emphasized at the state universities.

There were this year 65 degrees in chemistry, a larger number than had previously been conferred in any subject. It should, however, be remembered that chemistry is pursued like medicine as a preparation for professional work, and that a large percentage of those who take the doctor's degree in this science do not publish research work. The 37 degrees conferred in physics was the largest number that has been

TABLE III

Doctorates Distributed According to Subjects

	Average 10 Years 1898–1907	1908	1909	1910	1911	Total for 14 Years 1898–1911
Chemistry	32.3	54	43	48	65	533
Physics	15.5	22	25	25	37	264
Zoology	15.2	25	18	24	25	244
Psychology	13.5	23	21	20	23	222
Mathematics	12.1	23	14	23	25	206
Botany	12.6	11	16	10	20	183
Geology	7.1	5	13	10	15	114
Physiology	4.1	7	13	4	2	67
Astronomy	3.4	1	7	3	4	49
Agriculture	1.0	2	7	4	11	34
Bacteriology	1.4	1	5	1	4	25
Anthropology	1.0	4	4	2	2	22
Paleontology	1.6	1	0	2	0	19
Anatomy	.9	2	0	1	1	13
Pathology	.5	2	3	1	1	12
Engineering	.8	0	0	1	2	11
Mineralogy	.6	0	3	0	1	10
Metallurgy	.3	0	1	0	0	4
Geography	.1	1	1	0	1	4
Meteorology	.1	0	0	0	0	1
Total	124.1	184	194	179	239	2,037

	1908	1909	1910	1911	Total for 4 Years
English	30	27	31	33	121
History	32	22	25	26	105
Philosophy	25	14	19	26	84
Economics	17	42	7	16	82
German	14	14	16	7	51
Education	6	9	13	23	51
Latin	12	12	15	11	50
Romance	12	16	6	12	46
Sociology	6	6	14	18	44
Oriental	9	15	11	1	36
Greek	13	11	5	7	36
Political Science	9	4	9	6	28
Theology	7	2	1	7	17
Philology and Comparative Literature	0	1	5	1	7
Law	1	0	1	2	4
Music	1	0	1	1	3
Classical Archeology	0	0	0	1	1
Total	194	195	179	198	766

conferred in any science except chemistry. In the total number of degrees conferred, chemistry and physics are followed by zoology, psychology, mathematics, botany and geology. There were 33 degrees conferred in English, 26 in history and in philosophy, and 23 in education. The degrees conferred in foreign languages appear to be few in comparison with the number of teachers required in these subjects —11 in Latin, 7 in Greek, 12 in Romance languages and 7 in German.

The institutions which this year conferred two or more degrees in a science are: in *chemistry,* Johns Hopkins, 11; Harvard, 9; Chicago and Yale, 8 each; Columbia, 6; Cornell, 5; Wisconsin, 4; Brown, 3; Clark and Illinois, 2 each; in *physics,* Chicago, 6; Columbia, 5; Pennsylvania, Stanford and Wisconsin, 3 each; Clark, Cornell, Harvard, Johns Hopkins and Princeton, 2 each; in *zoology,* Columbia, Cornell and Harvard, 4 each; Chicago, Cincinnati, Clark and Indiana, 2 each; in *psychology,* Clark, 7;[3] Chicago, 6; Columbia, 4; Pennsylvania, 3; in *mathematics,* Yale, 5; Chicago, 4; Clark, Johns Hopkins, Pennsylvania and Princeton, 2 each; in *botany,* Chicago and Cornell, 4 each; Columbia, 3; Harvard and Johns Hopkins, 2 each; in *geology,* Wisconsin, 4; Columbia, 3; Chicago, Cornell, Harvard and Johns Hopkins, 2 each; in *agriculture,* Cornell, 6; Missouri, 2.

The names of those on whom the degree was conferred in the natural and exact sciences, with the subjects of their theses, are as follows:

UNIVERSITY OF CHICAGO

Henry Foster Adams: "Some Problems of Autokinetic Sensations."

Charles Orval Appleman: "Some Observations on Catalase."

Richard Philip Baker: "The Problem of the Angle-bisectors."

Jasper Converse Barnes: "Experimental Analysis of Voluntary Movement."

George William Bartelmez: "The Bilaterality of the Pigeon's Egg; A Study in Egg Organization."

William Hunt Bates: "An Application of Sym-

[3] At Clark education appears to be included under psychology, and in some other cases the thesis in psychology is not based on experimental work.

bolic Methods to the Treatment of Mean Curvatures in Hyper-space.''

Louis Begeman: ''The Determination of 'e' by the Cloud Method.''

Edwin Sherwood Bishop: ''A Determination of the Minimum Ionizing Kinetic Energy of an Electron in a Gas.''

Daniel Buchanan: ''A Class of Periodic Solutions of the Problem of Three Bodies, Two of Equal Mass, the Third moving on a Straight Line.''

Emma Perry Carr: ''The Aliphatic Imidoesters.''

Ethel Mary Chamberlain: ''Purkinje Phenomenon.''

Elbert Edwin Chandler: ''Ionization Constants of the Second Hydrogen Ion of Dibasic Acids.''

Grace Miriam Charles: ''The Anatomy of the Sporeling of Marattia Alata.''

J. Harry Clo: ''The Effect of Temperature upon the Ionization of Gas.''

William Skinner Cooper: ''The Climax Forest of Isle Royale, Lake Superior.''

Ira Harris Derby: ''Studies in Catalysis of Imidoesters, IV.''

Mabel Ruth Fernald: ''A Contribution to the Technique of Diagnosis and Development of Mental Imagery.''

Harvey Fletcher: ''A Verification of the Theory of Brownian Movements and a Direct Determination of the Value of Ne for Gaseous Ionization.''

Thomas Bruce Freas: ''A Study of Thermostats.''

Thomas Haigh Glenn: ''Variation and Carbohydrate of Bacilli of the Proteus Group.''

Mary Holmes Stevens Hayes: ''Cutaneous After-sensations.''

Allen David Hole: ''The Pleistocene Geology of the Telluride (Colo.) Quadrangle.''

Ansel Alphonso Knowlton: ''Preparation and Testing of Heusler Alloys.''

Stewart Joseph Lloyd: ''Studies in Radioactivity.''

Paul Stilwell McKibben: ''The Nervous Terminalis in Urodele Amphibia.''

John Colin Moore: ''The Action of Water on Acyl Isoureas.''

William Cabler Moore: ''Studies in Organic Amalgams.''

Robert Kirkland Nabours: ''Mendelian Inheritance in Orthoptera.''

Arthur Dunn Pitcher: ''The Interrelations of Eight Fundamental Properties of Classes of Functions.''

John Littlefield Tilton: ''The Pleistocene Deposits of Warren County, Iowa.''

Fred Wilbert Upson: ''On the Action of Normal Barium Hydroxide on d. Glucose and d. Galactose.''

Clara Jean Weidensall: ''Studies in Rhythm.''

Marion Ballantyne White: ''The Dependence of the Focal Point on Curvature in Space Problems of the Calculus of Variations.''

James Remus Wright: ''Photo-electric Effects of Metals as a Function of the Wave-length of the Incident Light.''

Mary Sophie Young: ''Morphology of the Podocarpineæ.''

COLUMBIA UNIVERSITY

Le Roy Abrams: ''A Phyto-geographical and Taxonomic Study of the Southern California Trees and Shrubs.''

George Denton Beal: ''Stilbazoles and Schiff Bases in the 4-quinazolone Group.''

Ralph Curtiss Benedict: ''The Genera of the Fern Tribe Vittarieæ.''

Frederick Gordon Bonser: ''The Reasoning Ability of Children of the Fourth, Fifth and Sixth School Grades.''

Joseph Valentine Breitwieser: ''Attention and Movement in Reaction Time.''

Jessie Yereance Cann: ''The Relationship existing between the Weight of a Falling Drop and the Diameter of the Tip from which it Falls.''

Garabed Krikor Daghlian: ''The Drop Weights of Twenty Non-associated Liquids and the Molecular Weights calculated for them.''

Clarence Norman Fenner: ''The Watchung Basalt and the Paragenesis of the Zeolites and other Secondary Minerals.''

George Augustus Geiger: ''Researches in the Quinazoline Group.''

Clarence Everett Gordon: ''The Geology of the Poughkeepsie Quadrangle.''

Isidor Greenwald: ''The Effect of Parathyroidectomy upon Metabolism.''

Edmund Newton Harvey: ''Studies on the Permeability of Cells.''

Michael Heidelberger: ''Phthalones in the Quinazolone Series and their Derivatives.''

Frank Dunn Kern: ''A Biologic and Taxonomic Study of the Genus Gymnosporangium.''

Edwin Kirk: ''The Structure and Relationships of certain Eleutherozoic Pelmatazoa.''

Francis Church Lincoln: ''Certain Natural Associations of Gold.''

Almer McDuffie McAfee: ''The Drop Weight

of the Associated Liquids—Water, Ethyl Alcohol, Methyl Alcohol and Acetic Acid.''

Charles Virgin Morrill: ''The Chromosomes in the Oogenesis, Fertilization and Cleavage of Coreid Hemiptera.''

Paul Radin: ''The Ritual and Significance of the Winnebago Medicine-lodge.''

Harry Wilfred Reddick: ''Systems of Tautochrones in a General Field of Force.''

Gaillard Sherburne Rogers: ''Geology of the Cortlandt Series and its Emery Deposits.''

Frederick William Schwartz: ''The Weight of a Falling Drop and the Laws of Tate. The Drop Weights and Molecular Weights of some of the Lower Esters.''

Aaron Franklin Shull: ''Studies in the Life Cycle of *Hydatina senta*.''

Edward Kellogg Strong, Jr.: ''The Relative Merit of Advertisements: a Psychological and Statistical Study.''

Edgar George Thomssen: ''The Weight of a Falling Drop and the Laws of Tate. The Determinations of the Molecular Weights and Critical Temperatures of Liquids by Aid of Drop Weights with an Improved Apparatus.''

Chin Yu Wen: ''The Effect of Organic and Inorganic 'Addition Agents' upon the Electro-deposition of Copper from Electrolytes containing Arsenic.''

Mary Theodora Whitley: ''An Empirical Study of certain Tests for Individual Differences.''

Louis Elsberg Wise: ''Para-aminobenzonitrile and its Derivatives.''

Leon Elmer Woodman: ''A Study of the Multiple Reflections of Short Electric Waves between two or more Reflecting Surfaces.''

CORNELL UNIVERSITY

Arthur Augustus Allen: ''The Red-winged Black-bird; a Study in the Ecology of a Cattail Marsh.''

Alvin Casey Beal: ''A Study of the Genus *Lathyrus*.''

George John Bouyoucos: ''Transpiration of Wheat Seedlings as affected by Soils, by Solutions of different Densities, and by various Chemical Compounds.''

Paul Prentice Boyd: ''On the Perspective Jonquières Involutions associated with the (2, 1) Ternary Correspondence.''

Mortimer Jay Brown: ''Aluminum Anodes in Liquid Ammonia Solutions of Ammonium Trinitride.''

Harold Joel Conn: ''A Study of Seasonal Variation among the Bacteria in Two Soil Plats of Unequal Fertility.''

Oscar Diedrich von Engeln: ''Phenomena associated with Glacier Drainage and Wastage.''

Henry Ellsworth Ewing: ''The Origin and Significance of Parasitism in the Acarina.''

Hing Kwai Fung: ''An Ecological Study of the American Cotton Plant with Incidental Reference to its Possible Adaptability in China.''

Henry Phelps Gage: ''The Radiant Efficiency of Arc Lamps.''

Franklin Stewart Harris: ''Studies in Soil Moisture and Fertility.''

Jessie Luella King: ''The Pyramid Tract and other Descending Paths in the Spinal Cord of the Sheep, and the Localization of the Motor Area in the Sheep's Brain by the Histological Method.''

Lewis Knudson: ''The Relation of *Aspergillus niger* and *Penicillium* sp. to Tannic Acid Fermentation.''

Robert Matheson: ''The Structure and Metamorphosis of the Fore-intestine of *Corydalis cornutus* L.''

Edson Hoyt Nichols: ''Octochlorindigo and some Derivates of the Tetrachlorphthalic Acid and Tetrachloranthranilic Acid.''

Edith Marion Patch: ''Homologies of the Wing Veins of the Aphididæ, Psyllidæ, Aleurodidæ and Coccidæ.''

Elmer George Peterson: ''The Elimination of Tubercle Bacilli.''

David Shepherd Pratt: ''A Study of the Phenol Sulphonic Acid Method for the Determination of Nitrates in Water.''

John Lyon Rich: ''Studies in the Physiography of Semi-arid Regions.''

Elmer Seth Savage: ''A Study of Feeding Standards for Milk Production.''

Pearl Gertrude Sheldon: ''The Atlantic Slope Arcas.''

Louisa Stone Stevenson: ''The Fluorescence of Anthracene.''

John Pogue Stewart: ''Factors Influencing Yield, Color, Size and Growth in Apples.''

John Armor Veazey: ''The Relation of Discharge Potential, Density of Kathode Ray Current and Intensity of Fluorescence in Crystals.''

Errett Wallace: ''The Scab Disease of the Apple.''

Arthur John Wilson: ''Influence of Phosphorus in Feeds on the Phosphorus Content of the Egg, and the Chemical Character of the Phosphorus Compounds.''

Frederick Adolph Wolf: ''The Life History and Development of some Fungi.''

HARVARD UNIVERSITY

Thomas Barbour: "A Contribution to the Zoogeography of the East Indian Islands."

Frederick Barry: (1) "The Molecular Refractions of Hydrochloric Acid and of Stannic and Stannous Chlorides"; (2) "The Heats of Combustion of Homologous Hydrocarbons."

Harold Eugene Bigelow: (1) "Some Derivatives of Bromtriioddinitrobenzol and Related Compounds"; (2) "The Heat of Solution of Barium."

Walter Ray Bloor: "The Carbohydrate Esters of the Higher Fatty Acids."

Paul Whittier Carleton: "Some Derivatives of certain Quinones and Aromatic Diketones."

Emory Leon Chaffee: "A New Method of Impact Excitation of Undamped Electric Oscillations and their Analysis by Means of Braun Tube Oscillations."

Fletcher Barker Coffin: "A Revision of the Atomic Weights of Cobalt and Arsenic."

Edward Carroll Day: "The Effect of Colored Lights on Pigment Migration in the Eye of the Crayfish."

Robert Fiske Griggs: "The Development and Cytology of Rhodochytrium."

Harvey Cornelius Hayes: "An Investigation of the Errors in Cooling Curves and Methods for avoiding these Errors; also a New Form of Crucible."

George Leslie Kelley: (1) "The Constitution and Reactions of certain Halogenated Orthobenzoquinopyrocatechin Hemiethers"; (2) "The Transition Temperature of Sodium Chromate."

Frederick Henry Lahee: "A Study of Metamorphism in the Carboniferous Formation of the Narragansett Basin."

Henry Laurens: "The Reactions of Amphibians to Monochromatic Lights of Equal Intensity."

Herbert Eugene Merwin: "Mineralogical and Petrographical Researches, with special Reference to the Stability Ranges of the Alkali Feldspars."

Emile Raymond Riegel: (1) "The Quantitative Determination of Antimony by the Gutzeit Method"; (2) "The Action of Sulphur Trioxide on Carbon Tetrachloride and Silicon Tetrachloride."

Clarence Livingston Speyers: "The Compressibilities and Surface Tensions of Water and Six Hydrocarbons."

Alban Stewart: "A Botanical Survey of the Galapagos Islands."

Thorbergur Thorvaldson: (1) "A Revision of the Atomic Weight of Iron"; (2) "Methods for the Adiabatic Determination of Heats of Solution of Metals in Acids."

Edward Gaige Titus: "Monograph of the Species of *Hypera* and *Phytonomus* in America."

Samuel Everett Urner: "Certain Singularities of Point-transformations in Space of Three Dimensions."

JOHNS HOPKINS UNIVERSITY

Paul Gough Agnew: "A Study of the Current Transformer, with particular reference to Iron Loss."

Thomas Bryce Ashcraft: "Quadratic Involutions on the Plane Rational Quartic."

Clara Latimer Bacon: "The Cartesian Oval and the Elliptic Functions."

John Lattimore Carpenter: "An Investigation of Manometers, of small Bore, for Use in the Measurement of Osmotic Pressure."

Gentry Cash: "A Study of the Osmotic Pressure of Cane Sugar Solutions at 30°, 35° and 40°."

Ernest Pohl Doetsch: "On the Rearrangement of the Tautomeric Salts of 1, 4-diphenyl-5-Thionurazole and 1, 4-diphenyl-5-Thiolurazole."

Julia Anna Gardner: "On certain Families of the Gastropoda from the Miocene and Pliocene of Virginia and North Carolina."

James Samuel Guy: "Conductivity and Viscosity in Glycerol and in Binary Mixtures of Glycerol with Ethyl Alcohol, with Methyl Alcohol and with Water."

Arthur Dunham Holmes: "A Study of the Semi-permeable Membranes of Zinc Ferrocyanide and of Copper Cobalticyanide."

Henry Hallock Hosford: "The Conductivities, Temperature Coefficients of Conductivity and Dissociation of certain Electrolytes from 0° to 35° and of certain other Electrolytes from 35° to 65°."

William Ralph Jones: "The Development of the Vascular Structure of *Dianthera Americana* L."

Nathaniel Edward Loomis: "A Study of the Hydrogen Electrode and of the Calomel Electrode."

Joseph Llewellyn McGhee: "A Study of Nickel Ferrocyanide as a Membrane in the Measurement of Osmotic Pressure."

Eli Kennerly Marshall, Jr.: "On the Reactions of Diazoalkyls with Urazoles and their Salts."

John Beaver Mertie, Jr.: "The Igneous Rocks of the Raton Mesa Region of New Mexico and Colorado."

Carroll Mason Sparrow: "On the Effect of the

Groove Form on the Distribution of Light by a Grating."

Eugene Pinckney Wightman: "A Study of the Conductivity and Dissociation of Organic Acids in Aqueous Solution between 0° and 35°."

Lula Gaines Winston: "The Conductivity, Temperature Coefficients of Conductivity and Dissociation of certain Electrolytes in Aqueous Solution, and Evidence for the Complexity of the Ion."

Harlan Harvey York: "The Origin and Development of the Embryo-sac and Embryo of *Dendrophthora opuntioides* (L.) Eich. and *D. gracile* Eich.

YALE UNIVERSITY

Harry Leslie Agard: "The Extension of some Theorems in the Theory of Sets of Points to N-dimensional Space."

Ida Barney: "Line and Surface Integrals."

Rowland Sherwood Bosworth: "The Rates of Solution of certain Metals in Dissolved Iodine, and their Relation to the Diffusion Theory."

Burton Howard Camp: "The Convergence of Singular Integrals."

Morris S. Fine: "Experimental Studies on the Utilization of Vegetable Proteins in Man and Animals."

John Lewis Jones: "Number Concept."

Carlton Howard Maryott: "On the Nature of the Reaction between Chlorine and Benzene in the Electrolytic Cell."

Claud Clair Perkins: "Molecular Silver, and its Use in the Gravimetric Determination of Iodine."

Edwin Jay Roberts: "The Separation of Cerium Earths."

William Cumming Rose: "Studies in Intermediary Metabolism: Mucic Acid and Carbohydrate Metabolism; the Physiology of Creatine and Creatinine Elimination, their Relation to Carbohydrate Metabolism."

James Cox Sanderson: "The Probable Influence of the Soil on Local Atmospheric Radioactivity."

Samuel Ray Scholes: "A Study of Vapor Pressures."

Louise Stanley: "The Occurrence of Purine Enzymes in the Tissues of Invertebrates and Lower Vertebrates."

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