# SCIENCE



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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

## *DOCTORATES CONFERRED BY AMERICAN UNIVERSITIES.*

WE are able to give again this year from official sources certain statistics in regard to the degree of Doctor of Philosophy, together with the names of those who have received it in the sciences and the titles of their theses. It appears from the following table that the doctorate has been conferred by twenty-three universities on 224 candidates.

| Universities. | Humanities. | History and Economics. | Sciences. | Total. | Compared with 1898. |
|---|---|---|---|---|---|
| Johns Hopkins | 13 | 8 | 17 | 38 | + 5 |
| Columbia | 4 | 6 | 23 | 33 | + 9 |
| Yale | 11 | 4 | 15 | 30 | — 4 |
| Chicago | 7 | 4 | 13 | 24 | — 12 |
| Harvard | 13 | 4 | 7 | 24 | — 2 |
| Pennsylvania | 7 | 5 | 8 | 20 | — 4 |
| New York | 8 | 0 | 1 | 9 | + 4 |
| Cornell | 3 | 2 | 2 | 7 | — 12 |
| Wisconsin | 0 | 3 | 4 | 7 | + 2 |
| Clark | 0 | 0 | 5 | 5 | — 7 |
| Michigan | 1 | 0 | 3 | 4 | — 3 |
| California | 0 | 0 | 3 | 3 | + 2 |
| Brown | 3 | 0 | 0 | 3 | + 2 |
| Bryn Mawr | 1 | 0 | 2 | 3 | 0 |
| Princeton | 0 | 0 | 3 | 3 | + 2 |
| Minnesota | 0 | 1 | 1 | 2 | + 1 |
| Virginia | 0 | 0 | 2 | 2 | + 2 |
| Washington | 0 | 0 | 2 | 2 | + 2 |
| Colorado | 0 | 0 | 1 | 1 | + 1 |
| Kansas | 0 | 0 | 1 | 1 | + 1 |
| Missouri | 0 | 0 | 1 | 1 | + 1 |
| Nebraska | 0 | 0 | 1 | 1 | — 1 |
| Syracuse | 1 | 0 | 0 | 1 | + 1 |
| Total | 72 | 37 | 115 | 224 | ..... |
| Compared with 1898.. | — 19 | — 1 | + 10 | ..... | — 10 |

The table gives a comparison with the data for last year which shows a decrease of ten in the total number of degrees conferred. This is doubtless an accidental variation without significance. The decrease of nineteen degrees in the humanities, under which are included philology, grammar, literature and philosophy, may also be accidental, but the comparatively small number of university doctorates in these subjects deserves consideration. Our educational system is largely based on the study of language, and in view of the great number of teachers required it appears that they are satisfied with a less adequate education than is the case in the sciences. In Germany every gymnasium teacher of Latin or French holds the equivalent of a doctorate, and there is evidently need of a higher standard in America. This year education and sociology have been placed with the sciences. Philology and economics are, of course, also sciences. The division is artificial and made only in respect to the general field covered by this JOURNAL.

Six universities, Johns Hopkins, Columbia, Yale, Chicago, Harvard and Pennsylvania, conferred 169 degrees—more than three times as many as all the other universities combined. Columbia gave this year decidedly the largest number of degrees in the sciences, while Harvard is the only one of these universities in which the degrees in the humanities were more numerous than in the sciences. The degree was not conferred last year by Indiana, Illinois, Stanford, Cincinnati, Columbian, Catholic, Western Reserve, Vanderbilt, or Tulane University. The degrees were in all cases the doctorate of philosophy, with the exception of two doctorates of science, one at Harvard and one at New York University.

The distribution of students among the different sciences was as follows:

| | | |
|---|---|---|
| Chemistry | 32 | +5 |
| Psychology | 15 | —3 |
| Mathematics | 13 | +2 |
| Botany | 11 | 0 |
| Zoology | 11 | —1 |
| Physics | 7 | —4 |
| Education | 5 | |
| Geology | 5 | —1 |
| Sociology | 5 | 4 |
| Paleontology | 4 | +4 |
| Astronomy | 2 | —1 |
| Mineralogy | 2 | +2 |
| Physiology | 1 | —3 |
| Bacteriology | 1 | +1 |
| Meteorology | 1 | +1 |

The second column, giving the increase or decrease as compared with last year, indicates that the sciences have in general maintained the same relative position. Chemistry leads so decidedly because in this science a university training is useful in technical work. The most disappointing aspect of university education seems to be the complete lack of medical students who take higher degrees. Here we have a field for research sure to yield results of the greatest possible theoretical and practical importance, and but very few trained workers. Physicians have opportunity, and in most cases leisure, but owing, it appears, to the lack of a proper education they accomplish comparatively little in the way of scientific research.

While no definite conclusion can be drawn from the results of a single year, it may be noted that at Johns Hopkins more than half the scientific degrees are given in chemistry. This science also leads at Yale and Harvard. Psychology and education are especially strong at Columbia. Chicago stands first in zoology and in physiology.

The details in regard to the theses are as follows:

COLUMBIA UNIVERSITY.

Burtis Burr Breese: Inhibition.

Edward Sandford Burgess: Studies in the Genus Aster.

Elsie Worthington Clews: The Educational Legislation and Administration of the Colonial Governments.

Henry Edward Crampton, Jr.: The Early History of the Egg in Molgula Manhattensis.

George Van Ness Dearborn: The Emotion of Joy.

Edwin Grant Dexter: Conduct and the Weather.

Elmer Wallace Firth: Micro-organisms in the Air of Public Buildings and Conveyances, due to Improper Methods of Cleaning.

Shepherd Ivory Franz: After-Images.

George Balthasar Germann: National Legislation concerning Education: Its Influence and Effect in the Public Land States East of the Mississippi.

Frederick Smith Hall: Sympathetic Strikes and Sympathetic Lockouts.

John Duer Irving: Some Eruptive Rocks of the Northern Black Hills and their associated Ore-bodies.

Smith Ely Jelliffe: The Flora of Long Island.

Edward Kasner: The Invariant Theory of the Inversion Group.

Walter Coluzzi Kretz: Positions and Proper Motions of the Principal Stars of the Cluster in Coma Berenices as deduced from Measurements of the Rutherfurd Photographs.

James Howard McGregor: Spermatogenesis in Amphiuma.

James Maclay: Double Minimal Surfaces whose Minimal Curves have Two Points on the Infinitely Distant Circle.

John Francis Woodhull: The Teaching of Physics in Secondary Schools.

Frederick John Pope: Investigation of Magnetic Iron Ores from Eastern Ontario.

George Albert Soper: The Purification of Drinking Water by the Use of Ozone.

Adna Ferrin Weber: The Growth of Cities in the Nineteenth Century.

Theodore Greely White: The Black River, Trenton, and Utica Formations in the Champlain Valley of New York and Vermont.

Harriet Winfield: The Oil of Maize.

Robert Sessions Woodworth: Psychology, The Accuracy of Voluntary Movement.

THE JOHNS HOPKINS UNIVERSITY.

Edward William Berger: Zoology, The Cubomedusæ, Physiological and Histological.

William Noland Berkeley: Chemistry, An Investigation of the Relative Rate of Reduction of Nitrobenzoic Acids.

Horace Greeley Byers: Chemistry, A Study of the Reduction of Permanganic Acid by Manganese Dioxide.

Joseph Scudder Chamberlain: Chemistry, A Further Study of two of the Products of Transformation of Parasulphaminebenzoic Acid when heated to 220°.

Francis Whittemore Cragin: Geology, The Paleontology of the Malone Jurassic Formation of Texas.

Oliver Lanard Fassig: Geology, March Weather in the United States, with special reference to the Middle Atlantic States: A Study of the Relations existing between Mean Atmospheric Pressure and the General Characteristics of the Weather and Storms in March.

George Stronach Fraps: Chemistry, The Composition of a Wood Oil.

Leonidas Chalmers Glenn: Geology, A Contribution to the Study of the Pelecypoda of the Miocene of Maryland.

Caswell Grave: Zoology, Ophiura Brevispina, Say.

Willis Boit Holmes: Chemistry, A Further Investigation of the Chlorides of Orthosulphobenzoic Acid and Paranitroorthosulphobenzoic Acid.

George Oscar James: Mathematics, On the Differential Equations connected with Hypersurfaces.

Joseph Francis Merrill: Physics, Influence of the surrounding Dielectric on the Conductivity of Copper Wires.

Rokuro Nakaseko: Chemistry, Some Transformations of Metasulphaminebenzoic Acid under the Influence of Heat.

Frederick Albert Saunders: Physics, A Bolometric Study of the Spectrum of an Absolutely Black Body between the Temperatures of 100° and 578° Centigrade.

Harold John Turner: Chemistry, Reaction of Sulphourea with Benzene- and Toluene-sulphon Chlorides.

Campbell Easter Waters: Chemistry, A Study of the Products formed by the Action of Heat on Parasulphaminemetatoluic Acid.

Francis Daniel Wilson: Chemistry, I. Orthosulphaminebenzoic Acid; II. Orthocarbaminebenzenesulphonic Acid.

James Henry Curry Winston: Chemistry, Action of Tetrazoditolyl Chloride and Tetrazodiphenyl Chloride on Certain Alcohols.

YALE UNIVERSITY.

Lee DeForest: Reflection of Electric Waves of very high frequencies at the ends of Parallel Wires.

Alexander William Evans: The Hawaiian Jubuloideæ, a Tribe of Hepaticæ.

Arthur Woolsey Ewell: Rotatory Polarization of Light in Media subjected to Torsion.

Herbert Ernest Gregory: Geology of the Aroostock Volcanic Area of Maine.

Franke Stuart Havens: Analytical Separations by Hydrochloric Acid.

Holmes Condict Jackson: Some Observations on the Carbohydrates of the Liver.

William Smythe Johnson: Researches in Practice and Habit.

Louis Cleveland Jones: The Estimation of Boric Acid.

Edward Martin Kindle: The Devonian and Lower Carboniferous Faunas of Southern Indiana and Central Kentucky.

Albert Galloway Keller: A Sociological Study of the Iliad and the Odyssey.

Matataro Matsumoto: Researches on Acoustic Space.

William Conger Morgan: The Stereochemistry of Nitrogen.

William Huntington Parker: 1. A Study of the Alloxuric Bases, with especial reference to their Origin in the Intestine; 2. On the Maximum Production of Hippuric Acid in Rabbits.

Leona May Peirce: On Chain-Differentiants of a Ternary Quantic.

Charles Hyde Warren: Investigations in Mineralogy and Crystallography, including a Description of four new Minerals from Franklin, N. J.

CHICAGO UNIVERSITY.

Frank Burnett Dains: On the Isourea Ethers and other Derivatives of Ureas.

Emily Ray Gregory: Vertebrate Embryology.

Wesley Walker Norman: The Reaction of Lower Animals upon Injuries and the Theory of Pain Sensations.

Wilson Robert Smith: A Contribution to the Life History of Isoetes.

Aaron Louis Treadwell: The Cytogeny of Podarke.

Elizabeth Jefferies: On Methanes.

William Clark Gordon: The Social Idea of Tennyson as related to his Time.

Charles Abram Ellwood: Some Prolegomena to Social Psychology.

Henry Gordon Gale: On the Relation between Density and Index of Refractions in Gases.

Irving Hardesty: The Number and Arrangement of the Fibers forming the Spinal Nerves of the Frog.

John Anthony Miller: Concerning certain Elliptic Modular Functions of Square Rank.

Nels Lawrence T. Nelson: Revision of the North American Species of *Solanum*.

James Harvey Ransom: Molecular Rearrangement of O-Animophenol Derivatives.

UNIVERSITY OF PENNSYLVANIA.

Oliver Perry Cornman: Psychology, Spelling, a Psycho-pedagogical Study.

John Brookie Faught: Mathematics, Certain Development Coefficients analogous to Bernouilli's Numbers.

Paul Renno Heyl: Mathematics, The Theory of Light on the Hypothesis of a Fourth Dimension.

Joseph Hidy James: Chemistry, An Electrolytic Study of Benzoin and Benzil.

Lily Gavit Kollock: Chemistry, Electrolytic Determinations and Separations.

Charles Dickens Nason: Pedagogy, The Schools of the Society for the Propagation of Christian Knowledge among the Germans of Pennsylvania.

Richard Conrad Schiedt: Zoology, Some Phenomena of Pigmentation.

Alfred Tingle: Chemistry, The Influence of Substituents upon the Electric Conductivity of Benzoic Acid.

HARVARD UNIVERSITY.

Gregory Paul Baxter: Chemistry, A Revision of the Atomic Weight of Cobalt.

Edward Charles Jeffrey: Botany, The Development, Structure, and Affinities of the Genus Equisetum.

Gilbert Newton Lewis: Chemistry, A General Equation for Free Energy and Physico-Chemical Equilibrium, and its Application.

Arthur Henry Pierce: Psychology, The Localization of Sound.

John Percival Sylvester: Chemistry, Some Sulphuramido Derivatives of Furfuran.

Edwin Mead Wilcox: Botany, Contributions to the Knowledge of Dormancy in Plants.

Justus Watson Folsom: Zoology, Studies upon the Mouthparts of Apterygota.

CLARK UNIVERSITY.

James W. Boyce: Mathematics, On the Steinerian Curve.

Henry H. Goddard: Psychology, The Influence of Mind on Body.

Edmund B. Huey: Psychology, Physiology and Psychology of Reading.

George E. Partridge: Psychology, The Psychology of the Intoxication Impulse.

Henry D. Sheldon: Psychology, The History and Pedagogy of American Student Societies.

UNIVERSITY OF WISCONSIN.

A. T. Lincoln: Chemistry.

W. B. Lane: Psychology.

J. C. Shedd: Physics.

Theo. Running: Mathematics.

UNIVERSITY OF CALIFORNIA.

George Davis Louderback: On the Origin of the Glaucophane and associated Schists of the Coast Ranges. A contribution to the theory of the Crystalline Schists.

Winthrop John Van Leuven Osterhout: Observations on Spindle-formation and Chromosome-reduction in Plants.

Milicent Washburn Shinn: A Study of the Development of Sense Activity in the first three years of Childhood, with Pedagogical Conclusions.

UNIVERSITY OF MICHIGAN.

John Black Johnston: Zoology, The Structure of the Brain of Acipenser Rubicundus.

Paul Ingold Murrill: Chemistry, Halides and Perhalides of the Picolines.

Edwin DeBarr: Chemistry, The Decomposition of Alpha, Beta, and Gamma, Halogen-substituted Acids by Water.

PRINCETON UNIVERSITY.

William Foster, Jr.: Chemistry, The Conductivity and Dissociation of some Electrolytes.

Stanley Chester Reese: Astronomy, The Jupiter Perturbations of Minor Plant 367, with an ephemeris.

Alexander Hamilton Phillips: Mineralogy, The Geological and Mineralogical Characteristics of the Rocky Hill Trap.

BRYN MAWR COLLEGE.

Helen Dean King: Morphology, The Maturation and Fertilization of the egg of Bufo Lentiginosus.

Emilie Norton Martin: Mathematics; Determination of the Non-primitive Substitution Groups of Degree Fifteen and of the Primitive Substitution Groups of Degree Eighteen.

CORNELL UNIVERSITY.

Patrick Beveridge Kennedy: The Fruits of Grasses, with Reference to their Structure, Morphology and Taxonomy.

Darwin Abbot Morton: Anethol and its Isomers.

UNIVERSITY OF VIRGINIA.

Hillary L. Roberts: Mathematics, On the Geometry of a certain Group of Transformations.

John E. Williams: On the Geometry of a certain Group of Transformations.

WASHINGTON UNIVERSITY.

Hermann von Schrenk: Botany, A Disease of Taxodium known as Peckiness, also a Similar Disease of Libocedrus Decurrens.

Louis Herman Pammel: Botany, Anatomical Characters of the seeds of Leguminosæ, Chiefly Genera of Gray's Manual.

UNIVERSITY OF COLORADO.

Arthur John Fynn: Pedagogy, The Pueblo Indian as a Product of Environment.

UNIVERSITY OF MINNESOTA.

Alice J. Mott: The tenth year of a deaf child's life.

UNIVERSITY OF KANSAS.

Joshua W. Beede: Paleontology.

UNIVERSITY OF MISSOURI.

Chas. Thom: Botany, Morphology and Physiology of Reproductive Organs in the Archegoniatæ.

UNIVERSITY OF NEBRASKA.

Carl Christian Engberg: 1, The Cartesian Oval; 2, An Extension in the Theory of the Characteristics of Evolutes.

NEW YORK UNIVERSITY.

William C. Alpero: The Oils and Terpenes of Arabia Indicautis.

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## *THE INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.*

IN a recent number of SCIENCE, Professor Carus has presented most serious objections to the bibliographical methods proposed by the Royal Society's Committee. For the professional zoologist such a verdict needs no criticism. For no one else can possibly claim to have such a wealth of experience at his disposal as this Nestor of scientific bibliography.

Severe as the criticisms of Professor Carus are, they may be supplemented by others which will make the case against the proposed schedules still stronger. Book bibliographies may entirely dispense with arbitrary symbols; the real test of a numerical system is to be sought in the application of the system to cards. Since I have been the pioneer in the publication of an extensive card catalogue of scientific literature, it was natural that the editors of SCIENCE should invite me to express in their columns a judgment upon the new proposals; but my criticisms, if frankly expressed, would have to be so severe that I was loath to take a position which would seem to place me in opposition to an enterprise to which I had already pledged allegiance. I feel, however, that I cannot withhold the following statement:

No one without extensive experience can possibly foresee the complications that arise