SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

FRIDAY, AUGUST 2, 1901.

CONTENTS:

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.

THE following table, compiled from official sources, gives details in regard to the conferring of the degree of Doctor of Philosophy during the past academic year:

	Humanities.	Sciences.	Total for 1901.	1900.	1899.	1898.
Yale	21	18	39	26	30	34
Chicago	20	16	36	37	24	36
Johns Hopkins	11	19	30	33	38	33
Harvard	14	15	29	36	24	26
Columbia	12	13	25	21	33	22
Pennsylvania	13	12	25	9	20	24
Cornell	8	13	21	19	7	19
Virginia	4	4	8	2	2	0
Clark	0	7	7	9	5	12
New York	5	1	6	7	9	5
Wisconsin	2	3	5	5	7	5
Columbian	2	1	3	5	0	1
Michigan	3	0	3	5	4	7
Princeton	3	0	3	3	3	0
Brown	1	1	2	3	3	1
Minnesota	2	0	2	3	2	1
California	0	2	2	2	3	1
Stanford	1	1	2	2	0	2
Bryn Mawr	0	2	2	1	3	3
Vanderbilt	0	1	1	3	0	0
Nebraska	0	1	1	1	1	2
Washington	0	1	1	0	2	0
Tulane	0	0	0	1	0	0
Colorado	0	0	0	0	1	0
Kansas	0	0	0	0	1	0
Missouri	0	0	0	0	1	0
Syracuse	0	0	0	0	1	0
Total	122	131	253	233	224	234

The table shows that the degree was conferred on 253 candidates, an increase of 20

as compared with 1900, of 29 as compared with 1899, and of 19 as compared with 1898. This probably represents the largest number of degrees conferred during any year since the development of our university system. The degree was conferred in the sciences in nine more cases than in the humanities, a gain for the sciences as compared with preceding years. In 1898 there was an excess of 24 degrees in the humanities; in 1899 of six degrees in the sciences, and in 1890 of seven degrees in the humanities. There appears to be consequently a relative increase in the number of those who pursue advanced studies in science. We have in previous years called attention to the fact that the division of the subjects into sciences and humanities is somewhat artificial. Those that have been allotted to the exact and natural sciences are shown in the accompanying table. Of the 253 degrees, three were doctors of science, one each being given by Cornell, New York and Vanderbilt. In view of the rareness with which this degree is conferred and the desirability of using it for an honorary degree, it seems evident that it should no longer be used as a practical equivalent for the Ph.D. The Ph.D. degree, we are glad to note, was not given *causa honoris* by any university from which reports have been received. It will be noticed that the universities are divided into two fairly distinct classes. Seven—namely, Chicago, Columbia, Cornell, Harvard, Johns Hopkins, Pennsylvania and Yale—have almost invariably given between 20 and 40 degrees each year, whereas none of the other universities reaches an average of 10. This year, for example, the seven universities mentioned gave 205 degrees as compared with 48 degrees by the twenty other universities on the list. We may doubtless, however, expect a rapid increase in the number of degrees given by the State universities of the Middle and Western States.

Harvard and Yale have this year given as many degrees in the sciences as in the humanities, whereas in previous years the humanities have predominated, as the sciences have at Johns Hopkins and Cornell. There was a relative excess in the number of degrees in chemistry at Johns Hopkins; in physics at Cornell and Johns Hopkins; in mathematics at Yale; in zoology at Chicago; in psychology at Clark, Yale and Harvard, and in geology at Johns Hopkins and Harvard.

The number of doctorates in the sciences last year and in the three preceding years is as follows:

	1901.	1900.	1899.	1898.
Chemistry	28	26	32	27
Physics	23	15	7	11
Mathematics	18	11	13	11
Zoology	15	11	11	12
Psychology	13	9	15	18
Geology	10	5	5	6
Botany	8	12	11	11
Astronomy	5	4	2	3
Sociology	3	3	5	—
Education	2	8	5	—
Physiology	1	4	1	4
Anthropology	1	2	0	2
Paleontology	1	2	4	0
Anatomy	1	—	—	—
Bacteriology	1	1	1	0
Engineering	1	—	—	—
Mineralogy	0	0	2	0
Meteorology	0	0	1	0
Total	131	113	115	105

The names on whom the degrees were conferred and the titles of their theses are as follows:

JOHNS HOPKINS UNIVERSITY.

Robert Montgomery Bird: The Action of Ammonia and of Alcohols and Alcoholates on the Chlorides of Orthosulphobenzoic Acid.

Jay Allan Bonsteel: The Soils of St. Mary's County, Md., showing the Relationships of the Geology to the Soils.

Lyman James Briggs: On the Absorption of Water Vapor, Carbon Dioxide and certain Substances in Aqueous Solution by Finely Divided Quartz.

Benjamin Palmer Caldwell: On the State of Equilibrium of Certain Double Iodides, Cyanides, Nitrates and Sulphates in Aqueous Solution.

Victor John Chambers: A Further Investigation of the Action of Phenols and Alcohols on the Chlorides of Paranitroorthosulphobenzoic Acid.

William Chambers Coker: Observations on the Gametophyte and Embryo of Taxodium Distichum.

Winterton Conway Curtis: Life History, Normal Fission and Reproductive Organs of Planaria Maculata.

James McDowell Douglas: The Dissociation of certain Acids, Bases and Salts at different Temperatures.

Joseph Christie Whitney Frazer: I. On Relations between the Color and the Composition and Constitution of the Alkali Salts of Nitrophenols. II. Comparison of the Metasulphaminebenzoic Acids made by Different Methods.

Norman Everett Gilbert: Some Experiments upon the Relations between Ether, Matter and Electricity.

Gilbert Logan Houser: The Neurones and Supporting Elements of the Brain of a Selachian.

Norton Adams Kent: Notes on the Zeeman Effect.

George Curtis Martin: The Miocene Gastropod Fauna of Maryland.

Francis LeJau Parker, Jr.: A Study of the Preparation of Permanganic Acid by Electrolysis.

Harold Pender: On the Magnetic Effect of Electrical Convection.

Israel Euclid Rabinovitch: The Foundation of the Euclidean Geometry, as viewed from the Standpoint of Kinematics.

George Burr Richardson: A Study of the Red Beds of the Black Hills of South Dakota and Wyoming.

Ward Weaver Simmons: A Further Study of the so-called infusible Diamide of Parasulphobenzoic Acid.

Charles Carroll Schenck: Some Properties of the Electric Spark and its Spectrum.

YALE UNIVERSITY.

Katherine Jeannette Bush: Descriptions of three New Genera and sixteen New Species belonging to the Tribes Sabellides and Serpulides.

Charles Montague Cooke, Jr.: The Hawaiian Hepaticae of the Tribe Trigonautheae.

Walter Wells Davis: Researches in Cross Education.

Edgar Selah Downs: The Induced Alternating Current Discharge studied with reference to its Spectrum and especially the Ultra-Violet Spectrum.

Arthur Sullivan Gale: On a Particular Class of Algebraic Minimum Curves and Surfaces.

Laurence Ilsley Hewes: Some Properties of Path-Curves of Continuous Projective Groups.

Treat Baldwin Johnson: Researches on Amidines and Imidoesters.

J. E. Wallace Wallin: Researches in the Rhythm of Speech.

Stuart Weller: Studies of the Paleozoic Faunas of the Interior Continental Basin of North America, Two Volumes.

Joshua Larson: A Computation of the Orbit of Σ 3062.

Edwin Hoyt Lockwood: Atmospheric Stability as affected by Water Vapor.

Ishiro Miyake: Researches in Rhythmic Action.

John Treadwell Norton, Jr.: The use of Sodium Thiosulphate in Analysis.

Charles Adams Peters: Oxalic Acid and the Oxalates in Analysis.

Chauncey Brewster Rice: An Experimental Study of the Wehnelt Interrupter.

Edward Christian Schneider: The Excretion of Kynurenic Acid.

Edwin Bidwell Wilson: The Decomposition of the General Collineation in Space into three Skew Reflections.

Ruth Goulding Wood: Non-Euclidean Displacements and Symmetry Transformations.

UNIVERSITY OF CHICAGO.

Charles Joseph Bushnell: The Development of the Corporation in England in Relation to the Sentiment of Antagonism.

John Gaylord Coulter: A Contribution to the Life History of Sium.

Elliot Rowland Downing: The Spermatogenesis in Hydra.

Minnie Marie Enteman: Coloration of Polistes (the Common Paper Wasp).

William Findlay: The Sylow Subgroups of the Symmetric Group on K Letters.

John Morris Gillette: The Culture Agencies of a Typical Manufacturing Group, South Chicago.

Ralph Stayner Lillie: Excretory Organs of Arenicola Cristata.

Anne Moore: The Effect of Electrolytes on Rigor Mortis.

Virgil Everett McCaskill: The Metamerism of Hirudo Medicinalis.

Ralph Harper McKee: The Isourea Ethers.

James Bertram Overton: Parthogenesis in Thalictrum purpurascens.

John McClellan Prather: The Skeleton of Salaux Microdon.

Fritz Reichmann: Capacities at Small Distances.

Samuel Bower Sinclair: The Possibility of a Science of Education.

Ernest Brown Skinner: On Ternary Monomial Substitution—Groups of Finite Order with Determinant ± 1.

Helen Bradford Thompson: Psychological Norms.

HARVARD UNIVERSITY.

Charles Hamlin Ayres, Jr.: Measurements of the Internal Resistance of Galvanic Cells.

Maurice Alpheus Bigelow: The Early Development of Lepas, A Study of Cell-Lineage and Germ-Layers.

Charles William McGowan Black: The Parametric Representation of the Neighborhood of a Singular Point of an Analytic Surface.

George Ashley Campbell: On Loaded Lines in Telephonic Transmisson.

Clarence Augustus Chant: The 'Skin'-effect in Electric Oscillators; with a Method of determining Wave-Lengths.

Thomas Harvey Haines: The Temporal Relations of Mental Processes: An Experimental Study of Objective and Subjective Simultaneity.

Robert William Hall: The Development of the Mesonephros and the Müllerian Ducts in the Amphibia.

Charles Nelson Haskins: On the Invariants of Quadratic Differential Forms.

George William Heimrod: The Silver Voltameter.

Edwin Bissell Holt: The Motor Element in Vision.

Ernest Howe: The Pre-Cambrian Intrusive Rocks of the Animas Canyon, Colorado.

Benjamin Shores Merigold: A Revision of the Atomic Weight of Uranium.

Raymond Herbert Stetson: Rhythm and Rhyme.

Reuben Myron Strong: The Development of Color in the Definitive Feather.

Alfred William Gunning Wilson: Physical Geology of Central Ontario.

COLUMBIA UNIVERSITY.

Grace Andrews: The Primitive Double Minimal Surface of the Seventh Class and its Conjugate.

Frederick Mark Becket: Electrolysis of Fused Salts.

Walter Richard Crane: Investigations on Magnetic Fluids with reference to Magnetic Ore Concentration.

Bergen Davis: On a Newly Discovered Phenomenon Produced by Stationary Sound Waves.

Alfred Newton Richards: A Chemical Study of Yellow Elastic Connective Tissue.

Arthur Cleveland Hall: Civilization and Crime.

Edward Frank Kern: The Quantitative Determination and Separation of Uranium.

Alfred Louis Kroeber: Decorative Symbolism of the Arapahoe.

George W. A. Lucky: The Professional Training of Secondary Teachers in the United States.

Joseph Warren Miller, Jr.: Elastic Properties of Helical Springs.

Herbert Raymond Moody: Reaction at the Temperature of the Electric Arc.

Francis Bertody Sumner: Kupfer's Vesicle and its Relation to Gastrulation and Concrescence.

Clark Wissler: The Correlation of Mental and Physical Tests.

CORNELL UNIVERSITY.

William Suddards Franklin: Poynting's Theorem.

Ernest Blaker: A Spectrophotometric Comparison of the Relative Intensity of Light from Carbon at Different Temperatures.

Judson Freeman Clark: On the Toxic Action of Certain Salts of Mercury and Copper.

Benton Dales: Contributions to the Chemistry of the Rare Earths of the Yttrium Group.

Margaret Clay Ferguson: The Development of the Pollen Tube and the Division of the Generative Nucleus in Certain Species of Pines.

William Benjamin Fite: On Metabelian Groups.

Henry Waldo Kuhn: On Imprimitive Substitution Groups.

Charles Philo Matthews: On Certain Improved Photometric Apparatus and Results therewith obtained.

Welton Marks Munson: The Horticultural Status of the Genus Vaccinium.

Rolla Roy Ramsey: The Effect of Gravity and Pressure on Electrolysis.

John Sandford Shearer: Some Effects of High Elective Tension on Dielectrics.

Carrie Ransom Squire: A Genetic Study of Rhythm.

George Walter Stewart: Distribution of Energy in the Spectrums of Acetylene.

UNIVERSITY OF PENNSYLVANIA.

Gilbert Hillhouse Boggs: I. The Separation of Vanadic Acid from Metals by means of Hydrochloric Acid Gas. II. The Occurrence of Molybdenum in the Mineral Endlichite.

Henry Shoemaker Conard: Water Lilies: a Monograph on the Genus Nymphæa.

Burton Scott Easton: Substitutions and Substitution Groups.

William Clarence Ebaugh: On the Atomic Weight of Arsenic.

Henry Brown Evans: The Right Ascensions of One Hundred and Eighty Latitude Stars.

Alice Macmichael Jefferson: Aromatic Bases as Precipitants for Rare Earth Metals.

John Raymond Murlin: The Digestive System of the Land Isopods, with special reference to the Morphology of Absorption and Secretion.

Marie Louise Nichols: The Spermatogenesis of

Oniscus asellus with especial reference to the History of the Chromatin.

Jonathan Taylor Rorer: A Definitive Determination of the Orbit of Comet 1898 χ—Brooks.

Thomas Maynard Taylor: I. The Atomic Weight of Tungsten. II. On the Ammonium Tungstates.

Caroline Burling Thompson: Zygeupolia Litoralis: A New Herteronemertean.

Roxana Hayward Vivian: The Poles of a Right Line with Respect to a Curve of Order n.

CLARK UNIVERSITY.

Clemence J. France: Psychology of Gambling.

Samuel B. Haslett: A Plan and Rationale of Sunday School Work.

James Edmund Ives: Contributions to the Study of the Induction Coil.

Herbert G. Keppel: The Cubic 3-spread Ruled with Planes in 4-fold space.

Melanchthon F. Libby: Influence of the Idea of Æsthetic Proportion on the Ethics of Shaftesbury.

Charles H. Sears: Studies in Rhythm.

John N. Van der Vries: On the Multiple Points of Twisted Curves.

UNIVERSITY OF VIRGINIA.

Dr. Wm. A. Lambeth: Geology of the Monticello Area.

C. J. Moore: On the Products of Interaction between the Aliphatic Amines with certain Metallic Salts.

Herbert R. Morgan: The Orbit of Enceladus.

L. D. Skeen: Bacterial Flora of Charlottesville Reservoir Water.

UNIVERSITY OF WISCONSIN.

Charles Kenneth Leith: Rock Cleavage.

Charlotte Elvira Pengra: On Functions connected with Special Riemann Surfaces, in Particular those for which $p=3$, 4 and 5.

Herman Schlundt: On the Dielectric Constants of Pure Solvents.

UNIVERSITY OF CALIFORNIA.

Russell Tracy Crawford: Determination of the Constant of Refraction from Observations made with the Repsold Meridian Circle of the Lick Observatory.

Frank Elmore Ross: Differential Equations Belonging to a Ternary Linearoid Group.

BRYN MAWR COLLEGE.

Mary Bidwell Breed: The Polybasic Acids of Mesitylene.

Elizabeth Rebecca Laird: The Absorption Spectrum of Chlorine.

BROWN UNIVERSITY.

Leonard Worcester Willians: The Anatomy of the Common Squid.

COLUMBIAN UNIVERSITY.

William Mather Lamson: Iron and Steel Domes.

LELAND STANFORD JUNIOR UNIVERSITY.

John Flesher Newson: A Geologic and Topographic Section across Southern Indiana, from the Ohio River at Hanover to the Wabash River at Vincennes, with a discussion of the General Distribution and Character of the Knobstone Group in the State of Indiana.

VANDERBILT UNIVERSITY.

Warren Henry Hollinshead: Some Points in Analytical Chemistry.

UNIVERSITY OF NEBRASKA.

Wilbur Clinton Knight: The Artesian Basins, Oil Fields and Mining Districts in Wyoming.

NEW YORK UNIVERSITY.

John A. Mandel: Glycuronic or Glucoronic Acid.

WASHINGTON UNIVERSITY.

Herbert J. Webber: Spermatogenesis and Fecundation of Zamia.

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*A BASIS OF SCIENTIFIC THOUGHT.**

LÉMERY in his *Cours de Chemie* (1675) was the first to separate that branch of science termed chemistry into organic and inorganic. The latter embraced those bodies found in the mineral world and those produced by means of such substances. Berzelius, recognizing that organic bodies contained carbon, maintained that they came about through the influence of a particular force—*vis vitalis*. In 1828, however, Wöhler synthetically prepared, from strictly inorganic materials in the laboratory, urea, the eventual product of animal metabolism. This discovery was followed by the synthesis of numerous other bodies hitherto thought to be possible of preparation only through the mysterious life-force.

Although the fundamental laws underlying these divisions of chemistry are the same, yet for pedagogic convenience this classification is adhered to by many; oth-

* Read at the April meeting of the N. C. Section of the American Chemical Society.