dynamics and circulation of the atmosphere was urged by the Russian meteorologist, Woeirof, at the Meteorological Congress in Paris last year. North and south of the equator, within the trade-wind belts, kites might be employed to determine the height to which the trades extend, and also the direction and strength of the upper winds, concerning which the high clouds, rarely seen in those latitudes, furnish our only information. In order to deduce the velocity of the upper current from the resultant velocity recorded at the kite, it is necessary to ascertain the direction of this latter force, which could be done from the orientation of the kite.

A. LAWRENCE ROTCH.

BLUE HILL METEOROLOGICAL OBSERVATORY, August 24, 1901.

GRADUATE COURSES IN SCIENCE.

AT the request of the editor, I have drawn up a list of the graduate courses in pure science offered by several of our leading universities during the academic year 1901–1902. Chicago, Columbia, Cornell, Harvard, Johns Hopkins, Pennsylvania and Yale have been chosen because during the past four years each of these universities has almost invariably conferred from 20 to 40 doctorates of philosophy, whereas no other university in our country has on the average conferred more than eight.

This information has been collected from the most recently issued announcements of graduate courses to be given by the respective universities during the ensuing academic year, and has been made as complete as the material at command will permit. In some instances the announcements of courses fail to distinguish clearly between primarily undergraduate courses and purely graduate courses, and the compiler has in such cases endeavored to discriminate as carefully as possible. Wherever the information has been obtainable, there is added in parenthesis to the announcement of each course the number of hours a week for which that course is scheduled. Unless otherwise stated, the common denominator employed is the unit hour per week during the entire academic year. Laboratory hours are distinguished by italics. The graduate courses given at the University of Chicago during the summer quarter of 1901 have been omitted, as also the graduate courses given at the recent summer sessions of several of the universities.

ANATOMY.

(Consult also Zoology.)

Chicago.

Professor Barker: Seminar; Advanced work and original research.

Columbia.

Professor Huntington: Laboratory courses in animal morphology.

Harvard.

Professors Dwight and Dexter: Research course in anatomy.

Johns Hopkins.

Professors Mall, Harrison and Bardeen: Advanced work and original investigation (daily).

Professors Mall, Harrison, Drs. Sudler, Lewis: Systematic instruction in gross human anatomy (afternoons).

Professor Bardeen, Drs. Knower, MacCallum: Systematic instruction in histology, microscopic anatomy, neurology, and embryology (mornings).

Pennsylvania.

Professor Jayne: Research in human anatomy.

Yale (see Zoology).

ANTHROPOLOGY.

Chicago.

Professor Starr: Physical anthropology, lab. (*4*); Laboratory work in anthropology (*4*); Japan (4, 6 wks.); Pueblo Indians of New Mexico (4, 1 qr.).

Columbia.

Professor Boas: Ethnography of America (2); Statistical study of variation (2); Physical anthropology (2); American languages (2).

Professor Farrand: General introductory course (2); Ethnology, primitive culture (2).

Professors Boas and Farrand: Research work in physical anthropology, ethnology and North American languages (daily).

Harvard.

Professor Putnam: American archeology and ethnology (research).

Drs. Woods, Dixon: General anthropology (3).

Dr. Dixon: Primitive religions ($1\frac{1}{2}$); Special ethnology ($1\frac{1}{2}$).

Yale.

Professor Sneath: Philosophical anthropology (2).

Professor Sumner: (See Sociology and statistics.)

ASTRONOMY.

Chicago.

Professor Hale: Solar physics (8); Stellar spectroscopy (8); *ditto* (4).

Professor Frost: Astronomical spectroscopy (4); Stellar spectroscopy (4); Celestial photometry (4, 1 qr.).

Professor Laves: Theory of absolute perturbations (4, 1 qr.); Theory of attractions and figures of the heavenly bodies (4, 1 qr.).

Professor Moulton: Theory of orbits and special perturbations (4, 1 qr.); Lunar theory (4, 1 qr.).

Professors Hale, Barnard, Frost: Astronomical and astrophysical research.

Columbia.

Professor Rees: General astronomy (2); Spherical and practical astronomy (2 + 2); Geodesy, theory (1); Advanced spherical and practical astronomy (2 + 4).

Professor Jacoby: Geodesy, applications (1); Summer school in practical geodesy (6 wks.); Theoretical astronomy (1); Theory and method of reduction of photographic star plates (1).

Professors Rees and Jacoby: Geodesy (1); The method of least squares, with applications to astronomy and to geodesy (1).

Dr. Mitchell: Astronomical spectroscopy (1).

Cornell.

———: Descriptive and theoretical astronomy (2).

Harvard.

Professor Pickering: Practical observatory work.

Professor Wilson: Practical astronomy (3).

Johns Hopkins.

Dr. Huff: Elements of astronomy (1).

Pennsylvania.

Professor Doolittle: Method of least squares (1); Reduction of stellar coordinates (1); History of astronomy (1); Observatory practice (6); Practical astronomy (3).

Mr. Eric Doolittle: Theoretical astronomy (2 and 3); Secular perturbations (3).

Yale.

Professor Beebe: Practical astronomy (2).

BACTERIOLOGY AND PATHOLOGY.

Chicago.

Professor Jordan: Research in bacteriology.

Drs. Hektoen, Wells: Research in pathology (*4* or *8*).

Columbia.

Professor Prudden and Drs. Hiss, Leaming: Advanced bacteriology with research (*afts., 3 mos.*).

Dr. Hiss: Advanced bacteriology (*afts., 3 mos.*).

Harvard.

Professor Ernst: Research courses.

Johns Hopkins.

Professor Welch and assistants: Bacteriology (laboratory), (*3 hlf. days a wk., 3 mos.*); Infection and immunity (1 or 2, 3 mos.); General pathology, pathological anatomy and pathological histology (*3 afts. a wk., 5 mos.*); Advanced work and special research.

Dr. MacCallum: Demonstrations in gross morbid anatomy (1); Conduct of autopsies.

BOTANY.

Chicago.

Professors Coulter, Barnes, Drs. Davis, Chamberlain: Research in Morphology (*4* or *8*).

Professor Coulter, Dr. Chamberlain: Special morphology of the pteridophytes (8, 1 qr.).

Professor Barnes: Special morphology of bryophytes (8, 1 qr.).

Professor Barnes, Mr. Livingston: Plant physics (4, 1 qr.); Plant chemics (4, 1 qr.); Growth and movement (4, 1 qr.).

Dr. Davis: Organic evolution (4, 1 qr.); General morphology of the bryophytes and pteridophytes (4, 1 qr.); General morphology of the spermatophytes (4, 1 qr.); Special morphology of the algæ (4, 1 qr.).

Dr. Chamberlain: Elementary histology (4, 1 qr.); Field botany (4, 1 qr.); Cytology (4, 1 qr.).

Dr. Cowles: Ecological anatomy (4, 1 qr.); Geographic botany (4, 1 qr.); Physiographic ecology (4, 1 qr.); Seminar in ecology (4 or 8); Research in ecology (4 or 8).

Columbia.

Professor Underwood: Morphology of fungi (*10*); Morphology of bryophyta (*10*); Morphology of pteridophyta (*10*); Taxonomy of fungi (*10*); Taxonomy of bryophyta (*10*); Taxonomy of pteridophyta (*10*).

Professors Underwood, Britton: Regional botany (*10*).

Professor Lloyd: Experimental morphology (*10*); Embryology of spermatophyta (*10*); Ecology (*10*).

Professor Britton: Taxonomy of spermatophyta (*10*).

Dr. Curtis: Plant physiology (2); General physiology (*10*); Physiological anatomy (*10*).

Dr. Howe: Morphology of algæ (*10*); Taxonomy of algæ (*10*).

Dr. MacDougal: Physiology of the cell (*10*); Ecological physiology (*10*).

Dr. Richards: Physiology of nutrition (*10*).

Dr. Rydberg: Morphology of spermatophyta (*10*).

Mr. Nash: Taxonomy of gramineæ (*10*).

Cornell.

Professor Atkinson and assistants: Comparative morphology and embryology (3); Mycology (3); Taxonomy of the bryophytes and pteridophytes (3); Methods of research in morphology and embryology (4); Plant physiology (4); Seminary in embryology, mycology, physiology etc. (1).

Professor Rowlee and Dr. Wiegand: Taxonomy and phylogeny of angiosperms (3); Comparative histology of plants (3); Dendrology (3); Research in taxonomy and phylogeny of the angiosperms (4); Research in comparative histology and cytology (4).

Harvard.

Professor Goodale: Morphology, histology and physiology of flowering plants (2); Principles of botanical classification, ecology and plant distribution (3); Structure and development of phanerogams (research).

Professor Thaxter: Cryptogamic botany ($1\frac{1}{2}$); Structure and development of cryptogams (research).

Johns Hopkins.

Dr. Johnson: Comparative morphology of the vegetable kingdom (2 + 2); Physiology and histology

of plants (2); Botanical journal club (1); Botanical seminary (1).

Pennsylvania.

Professor MacFarlane: Comparative histology of plants (1 + *2*); Plant irritability and nutrition (1 + *5*); Comparative morphology of the gymnosperma (2 + *4*).

Dr. Harshberger: Comparative taxonomy of plants (1 + *2*); Comparative morphology of the myxomycetes and fungi (1 + *4*).

Yale.

Professor Evans: Botany of the flowering plants (1½); General morphology of plants (4); Advanced morphology and taxonomy of plants.

Dr. Coe: Cytology and general embryology (2).

CHEMISTRY.

Chicago.

Professor Nef: Organic chemistry (4); Organic preparations (*10* or *20*); Research in organic chemistry (*30* to *40*); Special chapters of organic chemistry (4 hrs., 6 wks.); Journal meetings.

Professor Smith: Advanced general chemistry (4 hrs., 1 qr.); Research in general chemistry (*30* to *40*).

Professor Lengfeld: Inorganic preparations (*10* or *20*); Research in inorganic chemistry (*30* to *40*); Advanced inorganic chemistry (2 hrs., 1 qr.); Physicochemical methods (5 hrs., 6 wks.).

Professor Stieglitz: Advanced qualitative analysis (*10* or *20*); Advanced quantitative analysis (*10* or *20*); Special methods in quantitative analysis; Research in organic chemistry (*30* to *40*); The aromatic series (*2*).

Dr. Jones: Elementary spectrum analysis (qualitative) (2 hrs. 1 qr.).

Columbia.

Professor Pellew: Industrial chemistry, special applications, laboratory (3½); Industrial chemistry, preparation of chemicals (1); Industrial chemistry, advanced course.

Professor Bogert: Advanced organic chemistry, laboratory (*12*); *ditto*, research.

Professor Bogert and Dr. Caspari: Chemistry of methane and its derivatives (3); Chemistry of the carbocyclic and heterocyclic compounds (3); Organic chemistry, general laboratory course.

Professor Miller: Quantitative analysis, special methods (*16*); Advanced inorganic analysis (2 + lab.); Assaying, ores and metallurgical products (*2*); Special methods of assaying ores, alloys and furnace products (*4*).

Professor Morgan: Physical chemistry (3 + lab.); Physical chemistry, advanced (2 + *12*).

Dr. Wells: The spectroscope as applied to qualitative and quantitative analysis (*20*).

Dr. Jouët: Quantitative analysis.

Dr. Sherman: Proximate organic and sanitary analysis, quantitative (4 + *12* or *18*); Advanced proximate organic analysis (2 + lab.).

Cornell.

Professor Caldwell: Agricultural qualitative and quantitative analysis, advanced course; Beverages and foods (1).

Professor Dennis: General inorganic and ultimate organic analysis, advanced; Spectroscopic chemical analysis and colorimetry (1½); Qualitative and quantitative gas analysis (½); Technical gas analysis; Inorganic chemistry, advanced (3); *ditto* (laboratory); Inorganic chemistry, seminar (1).

Professor Trevor: Mathematical chemistry (3); Advanced mathematical chemistry (1).

Professor Bancroft: Physicochemical methods (3); Advanced physical chemistry (3); Advanced laboratory work, physical chemistry.

Professor Orndorff: Organic chemistry (3 + *3*); Special chapters in organic chemistry (2); Advanced organic chemistry, laboratory; The coal tar dye-stuffs (½); Stereochemistry (½); Seminar in organic chemistry (1).

Dr. Chamot: Food and water analysis (*3*); Microchemical analysis (3); Potable water (1); Toxicology (1); Toxicological chemistry (½).

Dr. Carveth: Introductory physical chemistry (2).

Mr. Cushman: Technical and engineering analysis; Assaying (3).

Harvard.

Professor Hill: Carbon compounds (3); Organic chemistry (research).

Professor Jackson: Organic chemistry (research).

Professor Richards: Historical development of chemical theory (1); Advanced quantitative analysis (1½); Gas analysis (1½); Physical chemistry, (3); Inorganic chemistry, including determination of atomic weights (research); Physical chemistry (research).

Professor Sanger: Applied chemistry (research).

————————: Electrochemistry (1½.)

Johns Hopkins.

Professor Remsen: Compounds of carbon (3); Historical topics in chemistry (12 lectures).

Professor Morse: Advanced inorganic chemistry (2).

Professor Jones: Physical chemistry (3); Elements of physical chemistry (1).

Pennsylvania.

Professor Smith: Advanced inorganic chemistry (2); History of chemistry (½); Electrochemistry (1); Mineral analysis (½); Analytical chemistry (½); Seminary (1).

Dr. Lorenz: Organic chemistry (2); Gas analysis (lab.); Physical chemistry (lab.).

Dr. Shinn: Industrial chemistry (1).

Yale.

Professor Mixter: Chemical physics.

Professor Wells: Qualitative analysis (1 + lab.); Quantitative analysis; Inorganic preparations; Advanced quantitative analysis; Metallurgy and assaying; Technical gas analysis; Investigations in inorganic chemistry.

Professor Gooch: Quantitative analysis (6); Chemical theory (1); Special methods; Research in inorganic chemistry.

Professor Wheeler: Advanced organic chemistry; Organic preparations.

Professor Browning: The rare elements (1); Inorganic preparations (2).

Dr. Locke: Systematization of inorganic compounds; Advanced inorganic chemistry; Application of the ionic theory to analytical chemistry; Constitution of chemical compounds.

Dr. Foote: Physical and electro chemistry (1); Physico chemical measurements (lab.); Electrochemistry (lab.).

Dr. Phelps: The carbon compounds (2); Organic synthesis (lab.).

Mr. Comstock: Elementary organic chemistry; Organic chemistry (1).

GEOLOGY (INCLUDING GEOGRAPHY).

Chicago.

Professor Chamberlin: Principles and theories of geology (6).

Professors Chamberlin and Salisbury: Special geology, selected themes.

Professor Iddings: Petrology (4 or 8); Special petrology (4 or 8).

Professor Weller: Special paleontologic geology (4 or 8).

Columbia.

Professor Kemp: Economic geology ($1\frac{1}{2}$); Petrology ($2+4$); Geological examinations and surveys (1).

Professor Dodge: Elementary physical geography, and geography of the United States (3).

Dr. Hollick: Paleobotany ($1+4$).

Dr. Jubin: Geology of building-stones (1); Metamorphism (1).

Dr. Grabau: Invertebrate paleontology ($2+4$).

Cornell.

Professor Tarr and assistants: Dynamic, structural and physiographic geology ($2+2\frac{1}{2}$); Physical geography ($3+$); Elementary meteorology (1); Glacial geology (3); Geological investigation; Seminar (2).

Professor Harris: Geological research in America (2); Conchology (2); Paleontological illustration ($\frac{1}{2}$); Field and laboratory work.

Dr. Ries: General economic geology (3); Clay investigation; Advanced economic geology.

Harvard.

Professors Shaler, Davis, Wolff, Smyth, Woodworth, Dr. Jaggar: Geological investigation in the field and laboratory.

Professors Shaler and Jackson: General paleontology (3); Historical geology (1); Advanced paleontology.

Professor Davis: Physiography of Europe ($1\frac{1}{2}$); Physiography, advanced (2).

Professor Smyth: Mining geology (3); Economic geology ($1\frac{1}{2}$); Mining geology, advanced (2).

Professor Jackson: General paleontology ($1+4$).

Professor Woodworth: General critical geology (3); Glacial geology ($1\frac{1}{2}$).

Professor Ward: General climatology ($1\frac{1}{2}$); Climatology of the United States ($1\frac{1}{2}$).

Dr. Jaggar: Advanced geological field work (2); Structural and dynamical geology of the United States (1).

Johns Hopkins.

Professor Clark and assistants: General geology (4); Paleontology (2); Historical geology (2).

Professor Reid: Experimental geology (1); Geological physics (1); Exploratory surveying (1).

Professor Abbe: Meteorology.

Dr. Shattuck: Physiographic geology (1).

Dr. Fassig: Climatology (1).

Mr. Willis: Stratigraphic and structural geology (1).

Dr. Bauer: Terrestrial magnetism.

Pennsylvania.

Professor Brown: Historical geology ($1+4$); Petrography ($1+4$); Chemical geology ($1+4$).

Dr. Ehrenfeld: Physical geology and physiography ($1+3$).

Professor Brown and Dr. Ehrenfeld: Paleontology of the invertebrates (5).

Yale.

Professor Williams: Historical geology (4); Evolution theories (2); Geological surveys; Practical geology.

Professor Beecher: General invertebrate paleontology (1); Invertebrate paleontology, faunal; Invertebrate paleontology, special; Research in invertebrate paleontology; Organic evolution; Taxology; Historical geology.

Professor Pirsson: Petrology; Elementary petrology ($\frac{1}{2}$); Elementary structural and dynamical geology ($1\frac{1}{2}$).

Dr. Gregory: Physiography.

MATHEMATICS.

Chicago.

Professors Moore, Bolza, Maschke: Mathematical reading and research.

Professor Moore: Theory of functions of real variables (4, 1 qr.); General arithmetic (4, 2 qr.); Seminar, Theory of functions of real variables (4, 2 qr.).

Professor Bolza: Abelian functions (4, 1 qr.); Seminar, Theory of abelian functions (4, 1 qr.).

Professor Maschke: Twisted curves and surfaces (4, 1 qr.); Theory of invariants (4, 1 qr.); Theory of functions (4, 2 qrs.); Seminar, differential geometry (4, 1 qr.).

Professor Dickson: Theory of numbers (4, 1 qr.).

Columbia.

Professor Fiske: Advanced calculus (3); Functions defined by linear differential equations (3).

Professor Cole: Theory of groups (3).

Professor Maclay: Theory of functions of a complex variable (3).

Mr. Keyser: Modern theories of geometry (3).

Cornell.

Professor Wait: Advanced analytic geometry (1); Advanced calculus, differential (3).

Professor Jones: Higher algebra and trigonometry (3); Theory of probabilities and least squares (2).

Professor Tanner: German mathematical reading (2); Algebraic invariants (2).

Professor McMahon: Quaternions and vector analysis (2).

Dr. Snyder: Projective geometry (3); General theory of algebraic curves and surfaces (3); Theory of functions (3).

Dr. Hutchinson: Advanced integral calculus (2); Theory of function (3).

Mr. Fite: Theory of groups (3); Theory of numbers (3).

——: Differential equations, advanced (3).

Harvard.

Professor J. M. Peirce: Calculus of quaternions (3); Theory of triangular coordinates and algebraic

plane curves (3); Application of quaternions to the theory of curves and surfaces (1½); Selected topics in quaternions (1½).

Professor Byerly: Advanced differential and integral calculus (3); Trigonometric series, spherical harmonics, potential function (3); Research, Picard's Traité d'Analyse, Vol. I.

Professor B. O. Peirce: Trigonometric series, spherical harmonics, potential function (3).

Professor Osgood: Infinite series and products (1½); Theory of functions (3); Research, calculus of variations.

Professor Bôcher: Higher algebra, polynomials and invariants (1½); Partial differential equations (1½); Linear differential equations of the second order (3).

Dr. Bouton: Theory of numbers (1½); Elementary theory of differential equations (1½).

Mr. Coolidge: Theory of equations, invariants (1½); Non-Euclidean geometry (3); Research, projective geometry.

Mr. Whittemore: Modern methods in geometry, determinants (3).

Johns Hopkins.

Professor Morley: Advanced geometry (3); The differential equations of physics (1); Mathematical seminar (1).

Dr. Cohen: Advanced differential equations (2); Theory of algebraic numbers (2); Elementary theory of functions (2).

Dr. Franklin: Probability.

Pennsylvania.

Professor Crawley: Plane analytic geometry (2); Higher plane curves (3).

Professor Fisher: Differential equations (2); Invariants and covariants (3); Theory of functions of a real variable (1½); Theory of functions of a complex variable (1½).

Professor Schwatt: Infinite series and products (3); Definite integrals and the functions of Bessel, Laplace and Lamé (3).

Dr. Hallett: Theory of substitutions (2); Theory of groups (2).

Department officers: Mathematical seminar.

Yale.

Professor Clark: Determinants (1); Differential equations (1).

Professor Gibbs: Vector analysis (1½); Advanced vector analysis (1½).

Professor Pierpont: Higher algebra (1½); Differential equations and function theory (3); Theory of functions (3).

Professor Smith: Advanced differential geometry (2); Foundations of geometry (1).

Dr. Porter: Advanced calculus (3); selected topics in differential equations (1½).

Dr. Granville: Differential geometry (1½).

Mr. Wilson: Projective geometry (1½).

MECHANICS.

Chicago. (Consult also Physics.)

Professor Maschke: Theory of the potential (4, 2 qr.).

Dr. Gale: Dynamics (4, 1 qr.).

Columbia.

Professor Woodward: Analytical mechanics (3); Advanced theoretical mechanics (2); Theory of the potential function (2); Geodynamics (2); Mathematical theory of elasticity (2); Theory of the conduction of heat in solids (2).

Professor Pupin: Thermodynamics (1½); Theory of dynamo and motor (1½); Theory of direct-current dynamo (1½); Theory of alternators and transformers (1½); Theory of variable currents (1½); Maxwell's theory of electricity and magnetism (2); Theory of Bessel's functions and spherical harmonics (1); Electro-magnetic theory of light (1½); Advanced thermodynamics (2); Theory of oscillations (2).

Mr. Pfister: Theoretical mechanics (2).

Cornell.

Professor Trevor: Mathematical theory of thermodynamics (2).

Professor McMahon: Theoretical mechanics (2); Potential function, Fourier's series and spherical harmonics (2); Mathematical theory of sound (2).

Professor Merritt: Electricity and magnetism; Theoretical physics, mechanics and thermodynamics (4).

————————: Mathematical theory of fluid motion; Mathematical theory of electricity and magnetism.

Harvard.

Professor Hall: Elements of thermodynamics (1½); Modern developments and applications of thermodynamics (1½).

Professors Byerly and B. O. Peirce: The potential function (3).

Professor Byerly: Dynamics of a rigid body (3).

Professor B. O. Peirce; Mathematical theory of electricity and magnetism (3).

Mr. Whittemore: Hydrostatics and hydrokinematics (3).

Johns Hopkins.

Professor Morley: Kinematics (1).

Pennsylvania.

Professor Goodspeed: Theory of the potential (1); Analytic statics (1); Rigid dynamics (2); Thermodynamics (1); Dynamics of a particle (1).

Dr. Richards: Application of harmonic series to physical problems.

Yale.

Professor Clark: Electricity and magnetism (1); Thermodynamics and properties of matter (2).

Professor Beebe: Celestial mechanics (3).

Professor Bumstead: Problems in mathematical physics (2).

Mr. Wilson: Analytical mechanics (1½).

MINERALOGY.

Chicago.

Professor Iddings: Advanced petrology (4 or 8); Special petrology (4 or 8).

Columbia.

Professor Moses: Descriptive and determinative mineralogy (2 + 3); Physical crystallography (1 + 4); Physical crystallography, advanced (6); Mineralogy, special (research).

Dr. Luquer: The minerals of building-stones (2); Optical mineralogy (2 + 3, 2 mos.); Optical mineralogy, advanced (12).

Cornell.

Professor Gill: Physical crystallography (1½); Petrography (1½); Seminar (1); Research work in mineralogy and petrography.

Harvard.

Professor Wolff: Petrography (3).

Professor Wolff and Dr. Palache: Physical crystallography; Mineralogical and petrographical research.

Dr. Palache: Crystallography.

Johns Hopkins.

Professor Mathews: General mineralogy (4); Advanced mineralogy (3); Petrography (3).

Pennsylvania.

Professor Brown: Mathematical and physical crystallography (1 + 4); Systematic mineralogy (1 + 4); Chemical and synthetic mineralogy (1 + 3); Determination of minerals (4).

Yale.

Professor Penfield: Determinative mineralogy (3); Crystallography (1); Descriptive mineralogy (1½); Descriptive mineralogy, advanced (1); Experimental work in crystallography and mineralogy; Research courses.

PHYSICS.

(Consult also Mechanics.)

Chicago.

Professor Michelson: Theoretical physics (4, 1½ qr.); Experimental physics, advanced (10); Research course (20); Spectrum analysis (4, 6 wks.); Interference methods and their application (4, 6 wks.).

Dr. Mann: Development of physical ideas (4, 1 qr.).

Columbia.

Professor Rood: Magnetism and electricity, sound (2 + 2 or 6); Light, heat (3 + 2 or 4).

Professor Hallock: Units and measurements, exact electrical measurement (2 + 2 to 3).

Professors Rood, Hallock, Dr. Tufts, Mr. Trowbridge: Laboratory courses in physics.

Cornell.

Professor Nichols: Physical seminar (2).

Professor Merritt: Theoretical physics (4); Recent advances in experimental physics (1).

Professors Nichols and Merritt: Advanced laboratory practice in general physics (research).

Professor Moler: Advanced photography (2).

Mr. Shearer: Theory of light (4); Wave motion (2).

Mr. Ambler: Theory of alternating currents (1).

Harvard.

Professor B. O. Peirce: Electrostatics, electrokinematics, electromagnetism (1, 6 to 8); Electricity and magnetism (research).

Professor Hall: Heat and electricity (research).

Professor Trowbridge: Electrodynamics (9); Light and electricity (research).

Professors Trowbridge and Sabine: Electrodynamics, magnetism, electromagnetism (2 + lab.).

Professor Sabine: The theory of the microscope (1½); Light and heat (2 + 6 to 8); Research courses in light and heat.

Johns Hopkins.

Professor Ames: General physics (3).

Professor Wood: Physical optics (1½); Recent progress in physics (3).

Mr. Whitehead: Applied electricity.

Pennsylvania.

Professor Goodspeed (see Mechanics).

Professor Goodspeed and Dr. Richards: Absolute physical measurements (3 to 9); Theory and practice of spectroscopy (3); Seminary (1).

Dr. Richards: Electricity and magnetism (2); Theory of sound (1); Radiation, electromagnetic theory (2).

Yale.

Professor A. W. Wright: Physics [heat, light, electricity, magnetism] (2); Advanced physics (2).

Professor Hastings: Theory of observation, method of least squares, theory of electricity, electrical measurements (3 + 6).

PHYSIOLOGICAL CHEMISTRY.

Chicago.

Professor Mathews: Physiological chemistry (4 or 6, 1 qr.).

Columbia.

Professor Chittenden, Dr. Gies, Messrs. Richards and Cutter: General physiological chemistry (2 + 6).

Dr. Gies, Mr. Cutter: Advanced physiological chemistry, laboratory (6).

Dr. Gies, Mr. Richards: Special physiological chemistry, laboratory (12).

Cornell.

Professor Orndorff, Mr. Teeple: Physiological chemistry (2 + 2).

Professor Orndorff: Advanced physiological chemistry (laboratory).

Harvard.

Dr. Koch: Chemical physiology (1½).

Yale.

Professor Chittenden: Physiological chemistry (2).

Professors Chittenden and Mendel: Physiological chemistry (4 + 4).

PHYSIOLOGY.

Chicago.

Professor Loeb: The physiological effects of ions (4, 1 qr.); Physiology of space sensations (4, 1 qr.); Physiological morphology and theory of tropisms (4, 1 qr.); Seminar (1); Research work (8).

Columbia.

Professor Curtis: Laboratory course in special physiology (3).

Professors Curtis, Lee, Dr. Green; The physiology of man as related to that of other mammals and of lower vertebrates (4).

Professor Lee: General physiology (1).

Professor Lee, Mr. Budington: Laboratory course in general physiology (5).

Cornell.

Professor Wilder, Dr. Stroud, Mr. Reed: Research in physiology (daily); Fortnightly conference.

Harvard.

Professor Bowditch: Experimental physiology (research).

Johns Hopkins.

Professor Howell: Research courses; Physiological journal club (1); Physiological seminar (1).

Professor Howell, Drs. Dawson, Erlanger, Mr. Stiles: Advanced research; Regular medical course ($1\frac{1}{2}+3$); Special course (3).

Yale.

Professor Chittenden: Elementary physiology (1); Experimental toxicology (1); Physiology of nutrition (1).

Professors Chittenden, Mendel: Experimental physiology (3); Seminary (2).

PSYCHOLOGY.

Chicago.

Professor Dewey: Seminar, mental development (4, 2 qr.).

Professor Angell, Dr. Fite: Experimental psychology, training course (4, 3 qr.); Experimental psychology, research (4, 3 qr.).

(See also Sociology and Statistics.)

Columbia.

Professor Cattell: Experimental psychology, introductory (2); Problems in experimental psychology (2); Research in experimental psychology (daily).

Professor Cattell, Mr. Davis: Experimental psychology, laboratory (*2* or *4*).

Professor Starr: Diseases of the mind and nervous system (1).

Professor Farrand: Physiological psychology (3); Abnormal and pathological psychology (1); Research in physiological and abnormal psychology.

Professor Thorndike: Genetic psychology, advanced (2); Research in genetic and comparative psychology.

Mr. Strong: Analytic psychology (1); Philosophy of mind (1); Research in analytic psychology and the philosophy of mind.

Cornell.

Professor Titchener, Drs. Bentley, Whipple, Mr. Baird: Systematic psychology (3); Laboratory exercises in psychology; Seminar in psychology, and advanced laboratory work.

Dr. Bentley: History of psychophysics ($\frac{1}{2}$).

Dr. Washburn: Social psychology.

Harvard.

Professor James: The psychological elements of religious life ($\frac{1}{2}$).

Professor Münsterberg: Psychological seminar, The theory of the will (2).

Professor Münsterberg, Dr. MacDougall: Experimental psychology, advanced research.

Dr. MacDougall: Advanced psychology ($1\frac{1}{2}$); Experimental psychology, elementary (*5*).

Pennsylvania.

Professor Witmer: Fundamental processes (1); Physiological psychology (1); Complex mental processes (1); Experimental psychology (1); Modern psychological theory ($1\frac{1}{2}$); Seminar in child psychology ($1\frac{1}{2}$); Research.

Yale.

Professor Duncan: General psychology, advanced (2).

Professor Scripture: Physiological and experimental psychology (2); Experimental psychology, elementary (2); Experimental phonetics (1); Theory of statistics and measurements (1); Technical course in experimental psychology (1); Research.

SOCIOLOGY AND STATISTICS.

Chicago.

Professor Small: The ethics of sociology (4, 1 qr.); Seminar, Problems in methodology and classification (4); The premises of general sociology (4, 1 qr.); An outline of general sociology (4, 1 qr.).

Professor Henderson: The group of industrials (4, 1 qr.); Seminar, Methods of social amelioration (4); Urban communities (4, 1 qr.); Philanthropy in its historical development (4, 1 qr.).

Professor Talbot: Seminar in sanitary science (4).

Professor Thomas: Art and the artist class (4, 2 qrs.); Development of mind in the race (4, 1 qr.); Primitive social control (4, 1 qr.).

Professor Vincent: Public opinion (4, 1 qr.); Education as a social function (4, 1 qr.).

Dr. Mitchell: Training course in statistics (4, 1 qr.).

Columbia.

Professor Giddings: Principles of sociology (2); Social evolution (1); Progress and democracy (1); Pauperism, poor laws and charities (1); Crime and penology (1); Seminar in sociology (1).

Professor Mayo-Smith: Statistics and sociology (1); Statistics and economics (1); Theory of statistics (1); Laboratory work in statistics.

Dr. Ripley: Racial demography.

Dr. Bayles: The civil aspect of ecclesiastical organizations (1).

Cornell.

Professor Willcox: Elementary social economics (2); Elementary statistics ($2+2$); Advanced statistics (2).

Professor Fetter: Methods of modern philanthropy (2).

Professor Powers: The modern régime (2); Social interpretation of art (1); Seminar, The evolution of society (2).

Harvard.

Professor Ashley: Statistics (1).

Professor Carver: Principles of sociology (3); Socialism and communism (1).

———: Seminar (1).

Johns Hopkins.

Dr. Brackett: Public aid, charity and correction (1, 3 mos.); Conferences on charitable legislation and custom in England and the United States (1).

Pennsylvania.

Professor Lindsay: Structure of modern society (2); Social-debtor classes (2); Seminar in sociology.

Yale.

Professor Sumner: The mental reactions (2); The beginnings of industrial organization (2); The science of society, elementary (2); The science of society, advanced (2).

ZOOLOGY (INCLUDING NEUROLOGY).

Chicago.

Professors Whitman, Lillie, Dr. Child: Zoological problems, research (1 + *18*).

Professor Davenport: Experimental and statistical zoology (8).

Professors Whitman, Davenport, Lillie, Dr. Child: Seminar in zoology (2).

Professor Donaldson: The growth of the brain and its physical characters as related to intelligence (2 + *4*, 1 qr.); Seminar in neurology (2); Research, the study of neurological problems (8).

Professor Donaldson, Dr. Hardesty: The architecture of the central nervous system (2 + *4*, 1 qr.); Gross and microscopic anatomy of the human central nervous system and sense organs (3 + *6*, 1 qr.).

Dr. Hardesty: The architecture of the central nervous system (2 + *10*, 6 wks.); Comparative histology of the central nervous system and sense organs (2 + *9*).

Columbia.

Professor Wilson: Comparative embryology (1 + lab.); Cellular biology (*3*).

Professor Osborn: Mammals, living and fossil (6).

Professors Wilson, Osborn: Comparative zoology, advanced (*10*).

Professor Dean: Classification and comparative anatomy of the vertebrates (1 + *2*); Embryology of fishes (1); Embryology of vertebrates ($\frac{1}{2}$ + 1).

Professor Crampton: Experimental embryology ($\frac{1}{2}$).

Dr. Calkins: General zoology of invertebrates, advanced ($1\frac{1}{2}$ + *3*); The protozoa ($\frac{1}{2}$ + *1*); Sanitary biology ($1\frac{1}{2}$).

Dr. Strong: Comparative neurology (1 + *4*); The human brain and spinal cord (1 + *4*).

Dr. McGregor: Mammalian dissection.

Professor Osborn, Dr. McGregor: Readings and conferences in Gegenbaur's *Vergleichende Anatomie* (1).

————————: Practical histology; Practical embryology; Seminar; Journal Club.

Cornell.

Professor Wilder, Dr. Stroud, Mr. Read: Research in vertebrate zoology and neurology (daily); Department conference.

Professor Comstock: Research in entomology (daily); Morphology and development of insects (2).

Professor Gage: Research in histology and embryology (*8*); Advanced microscopy ($2\frac{1}{2}$); Seminar in microscopy, histology and embryology.

Harvard.

Professor Mark: Anatomy and development of vertebrates and invertebrates (research).

Professor Mark, Dr. Rand: Microscopical anatomy ($1\frac{1}{2}$); Embryology of vertebrates ($1\frac{1}{2}$).

Professor Jackson: Fossil invertebrates ($1\frac{1}{2}$); Fossil invertebrates, special groups ($1\frac{1}{2}$).

Professor Parker: Introduction to the study of the nervous system ($1\frac{1}{2}$); The nervous system and its terminal organs ($1\frac{1}{2}$).

Dr. Rand, Mr. Carpenter: Comparative anatomy of vertebrates (3).

Dr. Castle: Experimental morphology, phylogenesis (2).

Johns Hopkins.

Professor Brooks, Drs. Andrews, Johnson: Advanced laboratory work (daily); Journal club (1); Seminar (1).

Pennsylvania.

Professor Jayne: Human anatomy (research); Mammalian osteology (research).

Professors Conklin, Montgomery, Dr. Calvert: Comparative anatomy and embryology of the invertebrata (1 + *5*); Zoological seminar (1).

Dr. Moore: Recent and fossil vertebrata (2 + *2*).

Yale.

Professor Verrill: Zoology, comparative anatomy, morphology, histology, systematic zoology.

Professor Smith, Dr. Coe: Elementary anatomy and histology (2); Comparative anatomy and general biology (3); Advanced comparative anatomy and general biology (daily).

Professor Ferris: Comparative morphology of the vertebrate brain (1).

Dr. Coe: Cytology and general embryology (2).

GEO. B. GERMANN.

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*PRIZE-SUBJECTS IN APPLIED SCIENCE.**

THE program of subjects for which prizes will be awarded by the Société industrielle de Mulhouse next year has been issued, and copies can be obtained upon application to the secretary of the Society. In general chemistry, medals will be awarded for the best memoirs or works on the theory of the manufacture of alizarin reds; the synthesis of the coloring matters of cochineal; theoretical and practical study of the carmine of cochineal; study of the coloring matter of cotton; the composition of aniline blacks; physical and chemical modifications which occur when cotton fiber is transformed into oxycellulose; action of chlorine and its oxygen compounds upon wool; constitution of coloring matters employed in linen fabrics; synthesis of a natural coloring matter used in industries; and theory of the natural formation of an organic substance and preparation of the substance by synthesis.

In connection with dyeing, medals will be awarded for the best works presented on the following subjects: A new mordant which admits of practical use; metallic solutions which give up their bases to textile fibers, and the conditions in which they are most effective; iron mordants and the part they play in dyeing according to their condition of oxidation and hydration; an aniline black which will not de-

* From *Nature*.