

which has been published in his honor, a "McClung Model" research microscope and a book of greetings. His portrait was unveiled and presented to the university.

The book of greetings was bound by hand in a hand-tooled leather cover and had an illuminated frontispiece bearing the inscription: "Greetings and Felicitations to Clarence Erwin McClung from Those Who Consider it a Privilege to Know Him as Teacher, Colleague and Friend." It contained more than two hundred letters sent from all parts of this country and from South America, Japan, China, India, South Africa and various European countries.

In his response Dr. McClung spoke briefly and feelingly of his appreciation of the sentiments and events of the evening.

RECENT DEATHS

JOANNES GREGORIUS DUSSE DE BARENNE, since 1930 Sterling professor of physiology at Yale University, died on June 9 at the age of fifty-five years.

DR. DAVID RIESMAN, professor of the history of medicine in the Graduate School of Medicine of the University of Pennsylvania, died on June 3, at the age of seventy-three years. He had been connected with the medical school since 1897.

DR. WILLIAM E. HARPER, director of the Dominion Astrophysical Observatory at Victoria, B. C., died on June 4. Dr. Harper was sixty-two years old.

DR. C. L. BOULENGER, professor of zoology at Bedford College, University of London, died on May 19 at the age of fifty-five years.

SCIENTIFIC NOTES AND NEWS

THE honorary degrees conferred by the Johns Hopkins University at its commencement on June 4 included the doctorate of laws on Dr. Vannevar Bush, president of the Carnegie Institution of Washington, and on Dr. Edwin Grant Conklin, executive vice-president of the American Philosophical Society and professor emeritus of zoology at Princeton University. Dr. Isaiah Bowman, president of the university, delivered the commencement address.

DR. CHARLES F. KETTERING, president of the General Motors Research Corporation, was prevented by work for the War Defense Board from being present to receive the honorary degree of doctor of science at the commencement exercises on June 9 of Rutgers University.

THE doctorate of science was conferred on Jason John Nassau, professor of astronomy and director of the Warner and Swasey Observatory of the Case School of Applied Science at Cleveland, at the commencement of Syracuse University. Owen D. Young, honorary chairman of the board of directors of the General Electric Company, who made the commencement address, received the degree of doctor of laws.

DR. LUTHER P. EISENHART, professor of mathematics and dean of the Graduate School of Princeton University, received the doctorate of laws from Duke University on June 3.

At the one hundred and fifth commencement of Albion College held on June 3 Harvey Newton Ott, for twenty years president of the Spencer Lens Company, was awarded the honorary degree of doctor of science. The citation by President John L. Seaton read in part as follows: "Leader with another honored Albionian in the development of the great Spencer Lens Company of Buffalo; noted as an inventor of

many mechanical improvements on microscopes; known to laboratory workers everywhere as a highly skilled designer of microtomes and other instruments of precision indispensable in research and the progress of science."

IN recognition of the services that David Sarnoff, president of the Radio Corporation of America, has rendered in the advancement of the science and industry of radio, the president of the French Republic has conferred upon him the decoration of Officer of the Legion of Honor, elevating him from the rank of chevalier which he has held since 1935. The decoration was presented to Mr. Sarnoff on June 6 by the French Consul General in New York, Count Charles de Ferry de Fontnouvelle, in whose office the ceremony took place.

THE 1940 Trudeau Medal of the National Tuberculosis Association has been awarded to Dr. Wm. Charles White for distinguished service in tuberculosis. Dr. White is chairman of the Division of Educational Relations of the National Research Council and consulting pathologist of the United States Public Health Service.

DR. GEORGE W. CORNER, professor of anatomy at the University of Rochester, was presented on June 10 with the first Squibb award of \$1,000 for research in endocrinology at the annual dinner of the Association for the Study of Internal Secretions meeting in New York City. The award was established by E. R. Squibb and Sons.

At the New York meeting of the American Association of Industrial Physicians and Surgeons on May 27, the annual William S. Knudsen award "for outstanding achievement in industrial medicine" was presented in recognition of advances in the knowledge of silicosis resulting from research directed by him to

Dr. Leroy U. Gardner, director of the Saranac Laboratory for the Study of Tuberculosis of the Edward L. Trudeau Foundation.

DR. GEORGE WASHINGTON CARVER, head of the department of agricultural chemistry at Tuskegee Institute, Alabama, on June 2 at the Hotel Pennsylvania, New York City, received the award of a bronze plaque commemorating his "brilliant achievements" from the International Federation of Architects, Engineers, Chemists and Technicians, a C. I. O. affiliate. The presentation was made by Dr. Franz Boas, professor emeritus of anthropology at Columbia University. The plaque was accepted by Dr. A. W. Curtis, Jr., research assistant to Dr. Carver, who was unable to attend.

DR. PAUL P. MCCAIN, of Sanatorium, N. C., was elected president of the National Tuberculosis Association at the thirty-sixth annual meeting, held recently in Cleveland.

DR. FRED ALBEE, of New York, was elected on June 8 president of the International College of Surgeons. Dr. Desiderio Roman, of Philadelphia, was elected president of the United States chapter of the organization. The United States chapter and the governing council decided to transfer headquarters from Geneva to Washington for the duration of the war.

DR. LAIGNEL-LAVASTINE, professor of the history of medicine at the University of Paris and a well-known medical historian, has been elected president of the Société Médicale des Hôpitaux de Paris for 1940, in succession to Professor Pierre Lereboullet.

INSTALLATION ceremonies of the University of Southern California Chapter of the Society of the Sigma Xi were conducted on May 24 by Dr. George A. Baitsell, professor of biology at Yale University, national secretary and past president, assisted by Dr. Carl D. Anderson, professor of physics at the California Institute of Technology, a member of the National Executive Committee. The award of the charter to the University of Southern California brings the number of chapters to sixty-nine. Officers elected for the year are: *President*, Dr. Harry James Deuel, professor of biochemistry; *Vice-president*, Dr. Robert Evans Vivian, professor of chemical engineering; *Secretary*, Dr. Francis Marsh Baldwin, professor of zoology, and *Treasurer*, Dr. Arthur Wickes Nye, professor of physics.

THE Case Chapter of the Society of the Sigma Xi held its annual initiation on the evening of May 31. Two faculty members and twenty-seven students were elected to full membership. Officers elected for the coming year are: Professor R. S. Shankland, *president*; Professor Paul L. Hoover, *vice-president*; Dean

T. M. Foeke, *treasurer*; Professor Richard S. Burington, *secretary*. Following the ceremonies, at which Professor F. M. Whitacre, retiring president, presided, Ray P. Dinsmore, of the Goodyear Tire and Rubber Company, Akron, spoke on the "Romance of Rubber."

PROFESSOR J. L. COOLIDGE, since 1918 professor of mathematics at Harvard University and since 1929 master of Lowell House, will retire from both positions with the title emeritus on September 1. He has been a member of the department of mathematics for forty years.

THE title of emeritus professor of mathematics has been conferred on Dr. Arnold Emch, of the University of Illinois, who joined the department of mathematics as assistant professor in 1911 and was appointed to a professorship in 1927.

WILBUR C. NELSON, aeronautical engineer with Engineering Projects of Dayton, Ohio, has been appointed assistant professor of mechanical engineering at the Iowa State College. He will be in charge of aeronautical instruction to succeed Colonel W. A. Bevan.

DR. C. A. BUEHLER, professor of chemistry at the University of Tennessee, will become head of the department of chemistry on July 1.

DR. DIRAN H. TOMBOULIAN has been appointed assistant professor of physics at Cornell University; Dr. Robert F. Bacher, now assistant professor of physics, has been advanced to the rank of associate professor.

DR. S. S. GOLDWATER, commissioner of hospitals, has accepted the presidency of the Associated Hospital Service (the 3c-a-day plan), of New York. More than a million and a quarter subscribers belong to the plan. Approximately four hundred of these subscribers are admitted daily to hospitals for necessary hospital services. Payments to hospitals are now being made at the rate of \$8,000,000 a year.

W. B. VAN ARSDEL has been appointed chief of the Engineering and Development Division of the Western Regional Research Laboratory of the U. S. Department of Agriculture at Albany, Calif. Mr. Van Arsdel will conduct the engineering development of processes worked out in the laboratory, and will make a study of industrial opportunities for expanding outlets of farm products.

THE American Pharmaceutical Association has elected Dr. Robert P. Fischelis, secretary and chief chemist of the Board of Pharmacy of the State of New Jersey, to serve for the next six years as one of its three representatives on the American Council of Pharmaceutical Education. This council is the national accrediting agency for Colleges of Pharmacy.

AN executive committee, composed of Professor Richard C. Tolman, Dr. Max Mason and Professor E. C. Watson, has been appointed by the trustees of the California Institute of Technology to provide means of mobilizing and coordinating effort in the present national situation. The council will proceed immediately with a survey of the possible contributions which the institute can make both through individual members of the staff and special facilities in the laboratories. All members of the committee were active in warfare service in 1918. Experts in fields of military significance have offered to devote a large portion of their time to defense work.

SIR WILLIAM BRAGG, president of the Royal Society, has been appointed president of a scientific food committee formed to estimate the food requirements of Great Britain and how to fill them during the present emergency.

DR. WILLIAM E. WICKENDEN, president of the Case School of Applied Science, Cleveland, will deliver the address at the eighty-first commencement on June 16 of Cooper Union, New York City. The exercises will be presided over by Dr. Gano Dunn, president of the union.

DR. SELMAN A. WAKSMAN, professor of soil microbiology at Rutgers University, gave an address on "Microbes in a Changing World" at the general session of the Florida Soil Science Society at its recent meeting at the University of Florida on May 29.

THE eighty-eighth annual meeting of the Society for the Promotion of Engineering Education will be held at the University of California from June 24 to 28. An honorary reception committee has been appointed, of which Professor Charles Derleth, Jr., dean of the College of Engineering, is chairman.

AN American Society of Agricultural Sciences, which will represent the American republics, has been organized. The society was formed in response to a recommendation of the eighth American Scientific Congress, which recently met in Washington. It was organized by delegates from twelve countries. The objects of the society are "To recognize agriculture as a basic industry of the Americas—a close tie between the American republics; to advance scientific agriculture in the republics through individual and collective effort; to provide a central organization for coordination of the agricultural sciences; to hold meetings, issue publications and otherwise disseminate agricultural information; to provide for exchange of research findings, ideas and experiences among members and to promote friendship among workers in agricultural sciences in the American republics."

At the Harrison, N. Y., meeting of the American

Laryngological Association the society made an offer to the Government of the medical services of its members in case of this country's involvement in war. The offer was without restrictions. It agreed that its members would, at the request of the Army, Navy or Air Corps, relinquish private practice and serve either individually or collectively as government physicians.

THE Federal District Court has ordered the arraignment on June 14 of the American Medical Association and several of its officers on charges of violating anti-trust laws. The order followed the Supreme Court's refusal to hear the plea of the association for exemption from the Sherman Anti-Trust Act on the ground that doctors were not engaged in "trade" within the meaning of the law.

At the alumni day dinner of the Massachusetts Institute of Technology on June 3, Dr. Karl T. Compton, president of the institute, announced that a gift of \$200,000 had been received from the Rockefeller Foundation for the initiation of a program of research and education in biological engineering, and a gift of \$100,000 from Alfred P. Sloan, Jr., chairman of the board of the General Motors Corporation, for the expansion of research for national defense. The gift will be used for the construction of a large addition to the airplane engine laboratory, making possible an increase in the effectiveness of its contribution to the national program of aircraft design and production.

GIFTS to the Field Museum of Natural History, Chicago, include 731 specimens of exotic birds from Melvin Traylor, Jr., of Chicago. These were collected on a recent expedition to Yucatan and Campeche, Mexico. The library of the museum has received also a gift of a hundred volumes from Dr. Henry Field.

THE National Forest Reservation Commission has approved the purchase of 132,217 acres of land for national forests in twenty-five states. The land will become part of fifty-one of the 196 national forests and purchase units. The total purchase price was \$601,740. Since the first of the year, the commission has sanctioned the buying of 391,485 acres at a cost of \$1,545,666.

THE department of physics at the University of Pittsburgh announces special graduate courses to be given in the summer session, from June 17 to July 26. These are on the physics of metals, given by Dr. Lee A. DuBridge, University of Rochester; Dr. R. P. Johnson, General Electric Company; Dr. W. V. Houston, California Institute of Technology; Dr. Frederick Seitz, University of Pennsylvania; Dr. B. E. Warren, Massachusetts Institute of Technology, and Dr. S. S. Sidhu, University of Pittsburgh; on the physics of glasses by Dr. Warren, and on nuclear

physics by Dr. DuBridge and Dr. A. J. Allen, University of Pittsburgh. There will be a seminar in nuclear physics conducted by Dr. E. U. Condon, Westinghouse Research Laboratories. Further information can be obtained by writing to the head of the department of physics.

THE fourth national conference in recent years of Small Fruits Breeders was held on April 26 and 27 in Eastern North Carolina. April 26 was spent at the North Carolina Coastal Plain Station at Willard, studying selections, varieties, selfed lines and outcrosses of strawberries; crosses of a number of Asi-

atic species of raspberries, and crosses for thornless and high-flavored blackberries and dewberries. In the evening Dean I. O. Schaub, of the North Carolina Station, presided at a round table conference at Wilmington. April 27 was spent in visiting the blueberry fields and breeding work at the Huntington planting at Atkinson and at the Crabbe planting at Magnolia. The breeding work visited is cooperative between the United States Department of Agriculture and the North Carolina Experiment Station. About thirty-five workers attended the conference, representing states from Maine to California.

DISCUSSION

FUNDAMENTAL LAWS OF OPERATIONS IN MATHEMATICS

ONE of the primary facts in the history of mathematics is the late appearance in the literature of this subject of special names for the laws of the fundamental operations of mathematics which are now commonly called the associative law, the commutative law and the distributive law, respectively. No evidence of a name for any one of these laws before the beginning of the nineteenth century has yet been published, notwithstanding the fact that all of them relate to the elementary operations with positive integers and hence to our oldest extant mathematical literature. The associative law might with good reasons be called the parenthesis law, since it asserts that an arbitrary number of the terms or factors which are to be combined by the same operation may be inclosed within a parenthesis and the terms or factors within the parentheses may then be combined separately into single terms or factors without affecting the final result.

Without giving a special name to this law it was noted by A. M. Legendre in his well-known "Essay sur la théorie des nombres," page 3 (1798), and it was explained quite fully by another French writer, J. D. Gergonne, in volume 1, pages 52-58 of the influential early mathematical periodical entitled *Annales de Mathématiques*, which appeared in 22 volumes (1810-1831) and is sometimes still called Gergonne's *Annales*. In this article Gergonne directed attention to the now well-known fact that for real numbers the associative law can be explained by means of a rectangular parallelepiped, since the volume of such a figure is the product of its base into its altitude and the base can be selected in six different ways. Similarly, the commutative law can be explained by means of a rectangle. The term associative law was introduced by the noted Irish mathematician, W. R. Hamilton (1805-1865), who used it frequently in his writings on quaternions and emphasized its importance.

The now common terms commutative law and distributive law were frequently employed by F. J. Servois

in an article published in Gergonne's *Annales*, volume 5 (1814), which its author called an extract, in substance, of works presented by him earlier to the French Institut, but which this Institut does not seem to have published. What may be of most interest in connection with these concepts is that they were named so recently. The commutative law and the distributive law in multiplication were noted already in Euclid's "Elements," but Euclid did not then use any special names in connection with these fundamental laws. His example was followed for more than two thousand years by later writers on mathematics. This is the more remarkable in view of the fact that the first proposition of Euclid's "Elements" relates to the equilateral triangle which is now commonly known to be transformed into itself by some non-commutative movements.

In the article under the entry "Number" in the "Encyclopaedia Britannica" (1938) it is stated that there are five fundamental laws of operation, *viz.*, two commutative laws, two associative laws and one distributive law. The commutative law of addition and the commutative law of multiplication are commonly regarded in the mathematical literature as the same law, but they are here regarded as two laws. Similar remarks apply to the associative law of addition and the associative law of multiplication. The nomenclature in this encyclopedia may be compared with the one employed in Zassenhaus's "Lehrbuch der Gruppentheorie," volume 1 (1937), in which the author lists one associative and one commutative law, but two distributive laws on page 62, *viz.*, a right distributive law and a left distributive law.

If one would say that the commutative and the associative laws should be said to change with the subjects to which they are applied there would evidently be no upper limit to the number of these fundamental laws, but it is difficult to see that anything could be gained by the use of such an unnecessarily complex nomenclature. At any rate it would appear desirable that an author who deviates from the common nomenclature should give some reasons for this deviation so that the