sented in the appendix to the third edition of *Theory of Operators in Hilbert Space*. Using the above results, S. P. Novikov, B. A. Dubrovin, and more recently V. A. Marchenko obtained solutions of remarkable classes of nonlinear partial differential equations of the Korteweg–de Vries type in an explicit and effective form.

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MOSHE LIVŠIČ

ALBERT, ABRAHAM ADRIAN (*b.* Chicago, Illinois, 9 November 1905; *d.* Chicago, 6 June 1972), *mathematics*.

Adrian Albert was the second of three children of Elias and Fannie Fradkin Albert. Albert's parents, originally from Russia, both immigrated to the United States, but his father's route to America had begun long before he met and married Fannie Fradkin, who was twenty years his junior. At the age of fourteen Elias ran away from his home in Vilnius for a new life in England. On his arrival he abandoned his Russian name (which remains unknown) and assumed the English surname Albert in honor of the prince consort. Although Elias taught school in England, on coming to the United States he worked as a retail merchant. This allowed him to provide a reasonably comfortable life for the family he insisted on raising in a formally orthodox Jewish, if not deeply religious, atmosphere.

Except for the years 1914 to 1916, when his family lived in Iron Mountain, Michigan, Adrian received all of his elementary, secondary, and university education in Chicago. In 1922 he entered the University of Chicago, obtaining his B.S. degree in 1926, his M.S. in 1927, and his Ph.D., under Leonard E. Dickson, in 1928. On 18 December 1927 Albert married Frieda Davis, and they took his National Research Council fellowship to Princeton for the academic year 1928–1929. Following a two-year instructorship at Columbia University, the Alberts returned to the University of Chicago permanently in 1931. Beginning as an assistant professor of mathematics, Albert moved steadily through the academic ranks, rising to the rank of full professor in 1941. In 1943 he was elected to the National Academy of Sciences, and in 1960 his university honored him with the E. H. Moore Distinguished Service Professorship. At Chicago, Albert served as the chairman of the mathematics department from 1958 to 1962 and as dean of the Division of Physical Sciences from 1962 to 1971. Albert was recognized for his leadership and service to mathematics in 1965 when he was elected president of the American Mathematical Society (AMS), a position he held through 1966. After he stepped down from his deanship in 1971, at the mandatory retirement age of sixty-five, he swiftly succumbed to the diabetes that had plagued him for many years.

Albert's contributions to mathematics ranged over three related algebraic areas: associative and nonassociative algebras and Riemann matrices. In the late 1920's Dickson's presence at the University of Chicago made it a world center for the study of algebras. In his 1923 book *Algebras and Their Arithmetics*, and in its more influential German translation of 1927, Dickson extended the theory of algebras that Joseph H. M. Wedderburn had so elegantly set up in his paper "On Hypercomplex Numbers." Wedderburn showed that the classification of finite-dimensional associative algebras over a field essentially reduced to a classification of the division algebras. From 1928 to 1932 researchers in this area pushed toward the classification of the finite-dimensional division algebras over the field of rational numbers Q. Albert was edged out in the race for this result in 1932 by the German team of Richard Brauer, Helmut Hasse, and Emmy Noether after independently hitting upon many of their ideas, most notably that of the Brauer group. At Hasse's urging, he and Albert coauthored a paper for the *Transactions of the American Mathematical Society* later in 1932 detailing Albert's contributions to this result.

Putting this setback behind him, Albert continued to work actively on associative algebras and focused most notably on determining whether all finite-dimensional central division algebras are crossed products, a question finally settled by Shimshon Amitsur in 1972. Albert's book, *Structure of Algebras*, published as a colloquium volume by the AMS in 1939, remains a definitive work on the theory of algebras and testifies to his achievements in this field.

In spite of his interest in associative algebras, however, Albert profited perhaps more from his contact with the geometer Solomon Lefschetz than with the increasingly reclusive Wedderburn during his year at Princeton. Lefschetz introduced Albert to multiplication algebras of Riemann matrices, constructs from algebraic geometry that Hermann Weyl made formally algebraic in his 1934 paper "On Generalized Riemann Matrices," published in the *Annals of Mathematics*. In a series of articles that also appeared in the *Annals* in 1934 and 1935, Albert gave necessary and sufficient conditions for a division algebra over $\boldsymbol{Q}$ to be the multiplication algebra of a Riemann matrix, the main research problem in the area. For this work he was awarded the Cole Prize in algebra by the AMS in 1939.

During the war years Albert continued his pure research efforts, concentrating on nonassociative algebras. In 1932 the physicist Pascual Jordan had defined the so-called Jordan algebra over a field for use in quantum mechanics. The algebra J over a field F of characteristic unequal to two is a Jordan algebra provided that for a, b in J, $ab = ba$ and $(a^2b)a = a^2(ba)$. Thus Jordan algebras are commutative but nonassociative. In the spirit of Wedderburn before him, Albert developed the basic structure theory of these algebras and published his main results in 1947. In addition Albert contributed to the war effort through his participation in the Applied Mathematics Group at Northwestern University, serving as its associate director in 1944 and 1945. He was also interested in the interrelations between pure mathematics and cryptography and lectured on this subject at the AMS regional meeting in 1941 at Manhattan, Kansas.

Throughout the 1950's and 1960's Albert continued his research on nonassociative algebras and frequently returned to associative questions. It was also during these decades that he contributed significantly to mathematics at the political level. He was instrumental in the late 1940's in securing government research grants for mathematics commensurate with those awarded in the other sciences. In 1950 he served on the committee to draft the mathematics budget for the newly formed National Science Foundation, and from January 1955 to June 1957 he chaired the "Albert Committee," which evaluated training and research potential in the mathematical sciences in the United States. He acted as consultant to the Rand Corporation and to the National Security Agency, and as trustee to both the Institute for Advanced Study and the Institute for Defense Analysis, after having directed the latter's Communications Research Division at Princeton from 1961 to 1962. At the international level Albert was elected vice president of the International Mathematical Union in 1970 to serve a four-year term beginning on 1 January 1971.

Although Albert's research on Riemann matrices and especially on nonassociative algebras was important, he made his primary contribution to mathematics in the field of associative algebras. His work in that area completed a major chapter in the history of algebra that had begun in 1907 with the foundational results of Joseph H. M. Wedderburn.

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Albert's original research focused primarily on three algebraic topics: associative and nonassociative algebras and Riemann matrices. Among his most noteworthy contributions to these areas are "A Determination of All Normal Division Algebras in Sixteen Units," in *Transactions of the American Mathematical Society*, **31** (1929), 253–260; "On Direct Products," *ibid.*, **33** (1931), 690–711; "Normal Division Algebras of Degree Four over an Algebraic Field," *ibid.*, **34** (1932), 363–372; "A Determination of All Normal Division Algebras over an Algebraic Number Field," *ibid.*, 722–726, written with Helmut Hasse; "On the Construction of Riemann Matrices: I," in *Annals of Mathematics*, 2nd ser., **35** (1934), 1–28; "Normal Division Algebras of Degree 4 over F of Characteristic 2," in *American Journal of Mathematics*, **56** (1934), 75–86; "A Solution of the Principal Problem in the Theory of Riemann Matrices," in *Annals of Mathematics*, 2nd ser., **35** (1934), 500–515; "On the Construction of Riemann Matrices: II," *ibid.*, **36** (1935), 376–394; "Normal Division Algebras of Degree p^e over F of Characteristic p," in *Transactions of the American Mathematical Society*, **39** (1936), 183–188; "Simple Algebras of Degree p^e over a Centrum of Characteristic p," *ibid.*,

ALBRIGHT

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See also Shimshon Amitsur, "On Central Division Algebras," in *Israel Journal of Mathematics*, **12** (1972), 408–420; David Kahn, *The Codebreakers: The Story of Secret Writing* (London, 1967); and Joseph H. M. Wedderburn, "On Hypercomplex Numbers," in *Proceedings of the London Mathematical Society*, 2nd ser., **6** (1907), 77–118.

KAREN HUNGER PARSHALL

ALBRIGHT, FULLER (*b.* Buffalo, New York, 12 January 1900; *d.* Boston, Massachusetts, 8 December 1969), *medicine, endocrinology*.

Albright was among a select group (including Herbert M. Evans, Edward C. Kendall, Robert Loeb, John P. Peters, and Lawson Wilkins) who forged the approach to clinical research in medicine and endocrinology during the middle third of the twentieth century. For more than twenty years he dominated the field of parathyroid physiology, until his career was terminated by illness in 1956. He held the rank of associate professor of medicine at Harvard Medical School and was physician in medicine at Massachusetts General Hospital at the time of his retirement. Albright was president of the American Society for Clinical Investigation (1943–1944) and the Association for the Study of Internal Secretions (1946–1947). He was elected to the National Academy of Sciences in 1955.

In 1897 Albright's father, John Joseph Albright, an affluent widower with three children, married Susan Fuller, a Smith College graduate. Fuller Albright, the third of their five children, was reared in a happy, close-knit family amid the advantages of wealth. He attended the Nichols School in Buffalo (founded by his father) and entered Harvard at age sixteen, graduating cum laude three years later. He enrolled at Harvard Medical School in 1920 and was an "exceptionally good" student. In his final year he gave a paper to the Boylston Society titled "The Physiology and Physiological Pathology of Calcium," with Joseph C. Aub as his sponsor. Aub's patronage was fortunate, for aside from interests in lead poisoning and calcium metabolism, he had trained in the Cornell division's metabolism unit at Bellevue, a prototype for the future Ward 4 research unit at Harvard. Albright graduated in 1924 and interned at Massachusetts General Hospital in 1925, staying another year as Aub's research fellow to work on calcium metabolism. Also in 1925, Ward 4 research opened and James B. Collip isolated parathormone, the principal ligand of calcium regulation.

Following a year as assistant resident at Johns Hopkins (1927), his interest in parathyroid function led Albright to join Jacob Erdheim in Vienna (1928–1929). Erdheim, a prolific investigator and brilliant bone pathologist, had noted tetany in parathyroidectomized animals as early as 1906. Albright frequently commented in later years that Erdheim "knew more about disease processes than any other living man." Erdheim's influence undoubtedly routed any thoughts of private practice, for in 1929 Albright joined the Harvard medical faculty and the staff of Massachusetts General Hospital, where he remained until his retirement.

Albright's marriage in 1933, to Claire Birge of New York, was of significance to his professional life. In 1935 he developed signs of Parkinson's disease, and it is doubtful that he could have maintained the strenuous pace of his later activities without her extraordinary courage, as well as the loyal support and physical care given by their sons, Birge and Reed. Though he was hampered by illness, his output was prolific in spite of the relatively short span of years in which he had to work.

In the late 1920's endocrinology was still a descriptive area of medicine—something of a freak show. Albright's work brought biochemical techniques and a rigorous scientific discipline into the field, compelling others to restructure their qualitative method of thought.