equally active) to β (or α) = 1 (where the correlation is 1 to 1).

Detailed examination was made of two systems: the bacteriostatic effectiveness of a series of acridines (*6*, p. 84 and Appendix I) at *p*H 7.2 to 7.4 and the similar activity of a series of sulfonamides (*7*) at *p*H 7. In the first system, it was observed by Albert (*6*, p. 84 and Appendix I) that the active principle is the acridinium cation and that structural modifications are of minor importance in determining activity compared with that of pK_A. We plotted log activity (*8*) versus ($pK_A - pH$) and, in agreement with Albert, we observed an α value of near 0. With the sulfonamides, activity is believed to reside primarily in the anion.

Bell and Roblin (*9*) obtained a nearly symmetrical, bell-shaped curve when they plotted log activity versus pK_A; but they were unable to develop a completely satisfactory mathematical relationship to fit their data. Their curve corresponds to those in Fig. 1 with a β value of 0.5 or 0.6 in that the maximum is correctly located; however, the slopes of both limbs of their observed curve are far too great to be accommodated by either of those from Fig. 1 or their own mathematical relationship. An attempted correction by Bell and Roblin for activity that might be due to the free acid gave only slight improvement. We examined the possibility that the free acid also was active and that its activity was related to pK_A by the exponential relationship (Eq. 8) and found that a very satisfactory fit could be obtained if one assumed a β value of 0.6 for the anion and an α value of 0.4 for the free acid.

Subsequent to the report of Bell and Roblin, several attempts were made to develop mathematical expressions to fit the data based on postulated mechanistic sequences of action. The most successful was that of Northey (*7*), who developed a satisfactory equation based upon the assumptions that activity within the cell was due to the anionic species and that the protonated form was essential to penetration through the cell wall.

Thus, it would seem that the relationships discussed in this paper are also of potential value in correlating physiological activity with dissociation constant and may be worthy of further examination in the field of biological assessment.

References and Notes

1. J. Epstein, D. E. Rosenblatt, M. Demek, *J. Am. Chem. Soc.* 78, 341 (1956).
2. R. Swidler, R. E. Plapinger, G. M. Steinberg, unpublished results.
3. B. E. Hackley, Jr., Ph.D. dissertation, University of Delaware (1956).
4. D. A. Frost and R. G. Pearson, *Kinetics and Mechanism* (Wiley, New York, 1953), p. 209 ff.

4a. In Eq. 1, k is the second-order rate constant as defined in Eq. 2, G_B and β are constants which are fixed for a given reaction under defined reaction conditions (temperature, solvent), K_B and K_A are the basic and acidic dissociation constants of the anion and its conjugate acid, and K_w is the ionization constant of water.

5. It has recently come to our attention that A. L. Green, G. L. Sainsbury, and M. Stansfield have independently evaluated this aspect of the application of the Bronsted relationship (private communication).
6. For a general discussion and leading references, see A. Albert, *Selective Toxicity* (Wiley, New York, 1951).
7. E. H. Northey, *Sulfonamides* (Reinhold, New York, 1948), p. 494 ff.
8. Activity was defined by us as minimum concentration at which inhibition was observed.
9. P. M. Bell and R. O. Roblin, Jr., *J. Am. Chem. Soc.* 64, 2905 (1942).

E. L. DeGolyer, Father of Applied Geophysics

Everette Lee DeGolyer, renowned as the world's foremost geologist and the father of applied geophysics, died 14 December at the age of 70, in Dallas, Texas, ending a half-century of brilliant service to the industry and the nation.

DeGolyer was born 9 October 1886, of homesteader parents, near Greensburg, Kansas. He attended the Joplin, Missouri, high school and entered the University of Oklahoma in 1906. There he studied geology and worked during the summers for the U.S. Geological Survey in the Rocky Mountain area. He left the University of Oklahoma as a senior, in 1908, to work for the Oklahoma Geological Survey and in the fall of 1909 accepted a job as field geologist for Mexican Eagle Oil Company, Ltd. While he was with Mexican Eagle, he staked the discovery well of the Tierra Amarilla field.

When DeGolyer staked the location for the prolific Potrero del Llano No. 4, he attained his first geologic fame. The well ultimately produced more than 100 million barrels.

DeGolyer returned to the University of Oklahoma in 1911 for his A.B. degree in geology. During this period he married Nell Goodrich, daughter of an Oklahoma City dentist.

In 1914 DeGolyer left Mexican Eagle and set up a consulting practice at Norman, Oklahoma. He made a geologic reconnaissance of western Cuba in 1915 and in 1916 opened a consulting office in New York. In 1918 he went to work for the U.S. Treasury, and his resulting study of Gulf Coast production-decline curves was incorporated in the Treasury's *Manual for the Oil and Gas Industry under the Revenue Act of 1918.* In 1919 he organized Amerada Petroleum Corporation for Sir Weetman Pearson and built the company into one of this country's most successful independent oil firms. Amerada's success was due largely to DeGolyer's pioneering efforts in oil geophysics, and it was during this period that he successfully directed the first geophysical survey of an oil field in the United States—a torsion-balance survey of prolific Spindletop field. The first salt dome and oil structure discovered in the United States by any geophysical method was the Nash Dome in Brazoria County, Texas, found early in 1924 by a torsion-balance survey made by the Rycade Oil Corporation, of which DeGolyer was president. DeGolyer also introduced the refraction and reflection seismic method of exploration and was well known for organization work throughout the industry.

In addition to organizing Amerada, he established the Geophysical Research Corporation and Geophysical Service, Inc., and was instrumental in the organization of Core Laboratories, Inc. In 1936, together with Lewis W. MacNaughton, he formed an association which resulted in the oil appraisal concern of DeGolyer and MacNaughton. The most recent product of his organizational genius was the founding of Isotopes, Inc., in 1955.

The oil and gas industry bestowed upon DeGolyer its most prized awards for his outstanding service. In addition to a host of honorary degrees and memberships, these include the Texas Mid-Continent Oil and Gas Association's distinguished service award, in 1939; the Anthony F. Lucas medal of the AIME, in 1941; the John Fritz medal of the Founder Societies (ASCE, AIME, ASME, and AIEE), in 1942; and the AAPG's Sidney Powers memorial award in 1950.

At his death, DeGolyer was senior chairman of the board of DeGolyer and MacNaughton and an active member of many other boards, including Louisiana Land and Exploration Company, Republic Natural Gas Company, Southern Pacific Company, General Minerals, an

Christiana Oil Corporation. Because of failing strength, he had recently resigned from the boards of Dresser Industries and Texas Eastern Transmission Corporation.

His phenomenal energy spilled over into other fields. He was nearly as well known in the literary world as in the oil industry. At one time he was controlling owner of the *Saturday Review*—a publication he brought back from the brink of bankruptcy—and an expert on historical and geographical literature of the Southwest and of the Spanish influence on this region. He was interested in the activities of the Smithsonian Institution, of which he was a regent.

DeGolyer was the scientist-executive, amazingly adept in the field of human relations. Through exceptionally clear thinking and a superb sense of timing, he was able to draw in his associates in the formation of an idea, enabling them to see clearly the same mental image that he himself visualized.

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E. P. Adams, Princeton Physicist

At the beginning of the century the department of physics of Princeton University consisted of only four men—C. F. Brackett, W. F. Magie, E. H. Loomis, and H. McClenahan—but the University must already have started to plan for a considerable expansion of the department. In 1903 those four were joined by P. E. Robinson and E. P. Adams, the latter having just completed 4 years of graduate work at Harvard, Berlin, Göttingen, and Trinity College, Cambridge, after taking his bachelor's degree at Beloit College in 1899.

In 1906 two further additions to the faculty in physics were made. These were O. W. Richardson from England and Augustus Trowbridge from Wisconsin, and with them the department took on a new activity in research in which Adams was an active participant. At this time he was very much interested in experimental research, and he directed the work of a number of graduate students. His interests were wide enough to encompass work in radioactivity, contact differences of potential, electromagnetic wave propagation, electrostriction, dielectric constant, and the Hall and Corbino effects.

In 1905 Princeton had also brought to its mathematics department the already famous James H. Jeans, who introduced new lecture courses in theoretical physics. When Jeans returned to England in 1909 this type of instruction had to be continued, and Adams was the individual who proved willing and able to step into the breach. In consequence, his research activities shifted gradually from experiment to theory. It was during this period, in 1913–14, that I first knew him, when I listened with great pleasure and profit to his senior course in electricity, using Jeans' *Electricity and Magnetism* as a textbook. Those lectures formed the strongest of my recollections of undergraduate days when I returned to graduate work, 5 years later.

World War I did not provide many outlets for physicists, but there was one very active field of work in sound-ranging. In 1917 Adams went on leave from Princeton University to join the Royal Engineers of the British Army for active service in France with a sound-ranging company, where he remained until his demobilization in March 1919. In recognition of his services he was made an Officer of the Order of the British Empire.

At the time that he returned from the war, Adams was considered one of the leaders in theoretical physics. He was, therefore, commissioned by the National Research Council to write a report on the existing state of the quantum theory, which had had a considerable development using classical ideas with superimposed quantum conditions, as in Bohr's atomic theory. Adams' report appeared in 1920, with a second edition in 1923, and was an authoritative textbook for a considerable number of years. He also at this time (1922) edited *The Smithsonian Mathematical Formulae and Tables of Elliptic Functions.* The most striking theoretical development of the period, the theory of relativity, also attracted Adams, and he was the translator for the lectures that Einstein gave in Princeton in 1921, which appeared as *The Meaning of Relativity.*

After these excursions into the new theories, Adams returned to his older loves and worked assiduously in the fields of classical electricity and mechanics. His courses in these subjects, as well as in statistical mechanics, were models of clarity, simplicity, and completeness. They form for me, and I know for many other Princeton graduate students, the most vivid memories of our student days.

Adams succeeded K. T. Compton as chairman of the physics department when Compton was called to the presidency of Massachusetts Institute of Technology, and he served in that capacity from 1931 to 1935, when he was succeeded by H. D. Smyth.

In the 1920's Adams was an enthusiastic horseman; because of his great height, about 6 feet 6 inches, and the small size of the horse he rode, he became known to the students as the "professor who goes out walking with a horse under him." Unfortunately this pastime proved disastrous; he was thrown from his horse and severely injured. His recovery from the accident and from the subsequent complications was slow and left his health permanently impaired. In spite of this he continued to work very actively, and indeed even after his retirement in 1943 his chief occupation was mathematics and its application to physical problems. In a letter written in October 1956, he remarked about the teaching of physics: "I still think there must be a solid foundation of Newtonian and Maxwellian physics, but how to make the transition to quantum and relativistic physics is what puzzles me. It seems as if it were about time for some new revolutionary principle to be evolved to do away with the discovery of new elementary particles."

Professor Adams was a rather difficult person to know, but once one had broken through into his friendship one found him a genial host and a man of subtle humor. He was a great lover of classical music and had even taught himself to play the piano with sufficient skill to get great enjoyment from it. He was a gentleman in the truest sense and of a kind which is becoming more and more rare. His personality will not be easily forgotten by the many Princeton graduate students who came under his influence, nor by his friends and colleagues.

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