of the two inositols (*neo*, *cis*) required to complete the series of nine theoretically possible stereoisomers were among the early achievements from these efforts.

From the standpoint of conformational analysis, the key work was that on borate complexing. The evidence pointed to the unorthodox conclusion that certain inositols and quercitols (cyclohexanepentols) form tridentate, adamantane-like boric esters. From the equilibrium constants for the formation of these esters, Angyal and D. J. McHugh in 1956 derived values for the energies of the non-bonded interactions of hydroxyl groups attached to cyclohexane rings. The use of these values in calculations related to conformation-dependent equilibria of glycosides and free sugars was logically next, but this step was not taken until a few years later. In the meantime, further studies of the influence of conformation on the chemical behavior of cyclitols revealed novel reactions (epoxide migration, with P. T. Gilham; acid-catalyzed epimerization of acetic esters, with P. A. J. Gorin and M. E. Pitman), and provided additional data on conformational free energies.

The cyclitols have figured less prominently in Angyal's recent work, which has encompassed a variety of researches on sugars and glycosides. However, he characteristically retained an interest in certain notorious problems in the cyclitol field, and eventually solved them. Two elegant examples are his determination (in 1969, with A. F. Russell) of the structure of phytic acid—a subject of controversy for over a half-century—and his clarification (1979, with D. Range, J. Defaye, and A. Gadelle) of the behavior of the inososes ("ketoinositols") in alkaline solution, a puzzle to investigators since the 1940's.

In the book "Conformational Analysis", published in 1965 with E. L. Eliel, N. L. Allinger, and G. A. Morrison, Angyal used his data on non-bonded interactions to calculate the conformational free energies of the methyl glycosides of the aldopyranoses. The result was a substantially more quantitative treatment of the conformations of these substances than that provided by the pioneering work of Reeves. The extension of the concept of conformational free energies to the sugars in solution was undertaken in a preliminary way in "Conformational Analysis", and developed more fully in a 1968 paper. The calculations were strikingly successful in rationalizing data, accumulated since the beginning of the century, on the ratios of the α- and β-pyranose forms of aldoses at equilibrium.

Subsequently, Angyal turned his attention to the conformational analysis of other groups of sugars and their glycosides, and to the consideration of pyranose–furanose equilibria. In the examination of these questions, extensive use was made of ^{1}H- and ^{13}C-n.m.r. measurements. As a net result, sizeable tracts of territory previously explored only sketchily were mapped and charted in detail.

Along with this later work on conformational questions, Angyal and his group have pursued several topics more purely chemical. The oxidation of acetylated methyl glycosides by chromium trioxide in acetic acid was studied (with K. James), and developed into a versatile method for the synthesis of ketonic sugar derivatives. The further processing of these products yielded many new compounds for use in other programs of the laboratory. Moreover, as the oxidation is specific, in the pyranoside series, for glycosides having the anomeric oxygen atom equatorially disposed, the reaction has found considerable use in structural studies on polysaccharides.

Another route to the understanding of the sugars in solution was found in the analysis of their behavior with alkaline earth and rare earth ions. Angyal's studies on the alkaline earth complexes, more extensive and more definitive than any previous work, are of interest in a variety of contexts. In his laboratory, complexation has been used to facilitate the synthesis of rare methyl glycosides, and in the separation of mixtures of methyl glycosides.

Angyal's flair for dealing with perennial, seemingly intractable problems in sugar chemistry is further illustrated by two of his very recent papers. In one of these, written with L. D. Hayward of the University of British Columbia, he provides estimates of the proportions of *aldehydo* (or *keto*) forms present in aqueous solutions of the common sugars. The estimates are based on o.r.d. measurements, and they fill a void that has existed for many years. In the second paper, published early this year, he shows that the conformational preferences of the methyl furanosides can be deduced from n.m.r. data. He then proceeds to settle the question of the applicability of Hudson's rules to the optical rotations of the furanosides. The tidying up of these loose ends is indeed a fitting culmination of over 30 years of research on the sugars and related substances.

An inveterate traveler, Professor Angyal has made numerous trips to Europe and the United States to attend scientific meetings and spend periods of sabbatical leave. He has received many invitations to lecture at symposia, and he has been a visiting professor or lecturer at the University of California–Berkeley, Imperial College, Oxford University, the University of Grenoble, and the Eidg. Technische Hochschule in Zürich. His honors include the H. G. Smith Memorial Medal and the Archibald D. Olle Prize of the Royal Australian Chemical Institute, and the O.B.E. (Officer of the Order of the British Empire). The first D.Sc. granted by the University of New South Wales was awarded to him in 1964. He is a Fellow of the Australian Academy of Science and of the Royal Australian Chemical Institute, and he has served as President of the University of New South Wales Chemical Society. Most recently he was chosen by The Chemical Society (London) to give the 1980 Haworth Memorial Lecture.

Professor Angyal's researches are described in some 150 scientific papers and reviews. Over 75 collaborators are listed as coauthors, including 9 M.Sc. students and 13 Ph.D. students. Only a few of the collaborators could be mentioned by name in this brief note, but Professor Angyal would be the first to insist that all share the credit for the achievements summarized.

In addition to his students and close collaborators, a wide circle of chemists have come to know Stephen Angyal as a warm and loyal friend. Many of us have drawn inspiration and stimulation from him, to the benefit of our scientific work. As friends, and as carbohydrate chemists, we salute him on this occasion.

LAURENS ANDERSON