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Roberts J D & Mazur R H. Small-ring compounds. 4. Intercnvrsion reactions of cyclobutyl, cyclopropylcarbinyl and allylcarbinyl dervatives.
J. Amer. Chem. Soc. **73:**2509-20, 1951.

This paper was the first to provide a basb for understanding the almost bewildering variety of product mixtures obtained in reactions starting with the simple C_4H_7X derivatives which have cyclobutyl, cyclopropylcarbinyl, and the allylcarbinyl carbon skeletons. In addition, it was shown that cyclopropylcarbinyl and cyclobutyl derivatives were very unusually reactive, far more so than the theories of organic reactions could accommodate at the time the research was done. [The *SCI*® indicates that this paper was cited 214 times in the period 1961-1976.]

John D. Roberts
California Institute of Technology
Div. of Chemistry & Chemical Engineering
Pasadena, CA 91125

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"Of the some 400 papers I have published before and after 1951, none has given me more satisfaction than this one The reasons are several. First, R. H. Mazur was one of the first graduate students to elect to work with me at MIT, and he was absolutely outstanding–a man of great intellectual power, with a deep interest in mathematics, who for reasons not clear to me, then or now, wished to do experimental work in organic chemistry. It was a continuing pleasure to watch Mazur's scientific development. Whenever I suggested he try an additional experiment, he said, 'That was done last week, and here are the results ' After completing his PhD at MIT, Mazur went on to become a well-known research chemist at G. D. Searle where, among other things, he and his coworkers developed the low-calorie peptide sweetener, aspartame.

"The second reason was that, although the research involved rather simple, four-carbon, organic compounds and simple reactions, the problem was a challenging one, because we had no good clues at all to what the final outcome would be. Of course, the dilemmas posed by the previously reported work in the area could have had trivial solutions we were just not smart enough to anticipate However, it did turn out that we were breaking new ground, with implications for organic chemistry in a rather broad way But even more, the work brought forth a whole new set of chemical puzzles associated with the patterns of reactivity of the substances we investigated Attempts to solve these puzzles account for the twenty-two follow-up papers we published, and for the large number of times the article has been cited by others Interestingly, the most important of the new puzzles has still not been resolved 26 years later, and is the subject of active experimental and theoretical investigation in several laboratories.

"Finally, the paper aroused controversy, particularly because one of the important conclusions was seriously questioned by H. C. Brown (Purdue), who claimed it was based on faulty experimental data The reason was that our results did not agree with those he and his coworkers had obtained on the key compound described in our paper It was indeed true that Mazur had carried on his research with relatively unsophisticated techniques compared to what we might use on the same problem today However, Mazur was a very careful worker and seemed incapable of the error attributed to him It was therefore very satisfying when a re investigation of the samples and procedures used by Mazur, ten years after completion of his thesis, verified his findings in every detail and further determined that Brown had analyzed his own data incorrectly.

"That the key problem posed by our 1951 paper regarding the structures and ease of interconversion of the evanescent cationic intermediates involved in the reactions of cyclopropylcarbinyl. cyclobutyl and allylcar binyl derivatives has still not been resolved, even after so many years of intensive study, strongly suggests that some of our basic approaches to determine and formulate organic structures, even for very simple molecules, need further revision and strengthening. "