

This feature article on Professor R. H. Wilhelm, of Princeton University was submitted by anonymous friends of CEE who treasure a total of 37 man-years of Wilhelm-watching.

Nearly ten years ago Princeton's School of Engineering was being visited by an inspection team from the Ford Foundation prior to that Foundation's decision to award a sizeable sum of money for development of the Engineering School. Part of the inspection included an informal discussion between the visitors and several of the younger faculty of the Department. In response to a rather general question concerning the attributes of the Chairman of the Department of Chemical Engineering, one of the faculty offered the statement, "I have never known a man of his age and with his administrative responsibilities who so consistently launches truly creative ideas in science and technology." That description of Professor Richard H. Wilhelm, Chairman of the Department of Chemical Engineering at Princeton University, is as valid today as it was in 1959. Whether he is attempting to rejuvenate a tired and stalled committee or the mind of an apathetic graduate student, Dick's approach is marked by these characteristics: Recall several similar (but not identical) situations from past experience, carry them into an entirely different context, mold the ingredients together with a novel new idea, and produce a policy, a piece of apparatus, or an explanation that no one else would have thought of for at least five years. The results may be as diverse as a new curriculum combining engineering and public affairs, or a new technique for separating mixtures, dubbed by its inventor "Parametric Pumping." (Those interested in the latest installment describing this remarkable tool are referred to page 522 of the February 2, 1968, issue of *Science*.) It is characteristic that Dick is now busy with application of the parametric pumping principle to problems of active transport in biological systems.

Over the years Dick Wilhelm has maintained that a sound education in engineering fundamentals comprised the best foundation for both the future company executive and the future scholar. Examination of the positions now held by Departmental alumni, both in management and research shows that the results from a curricu-

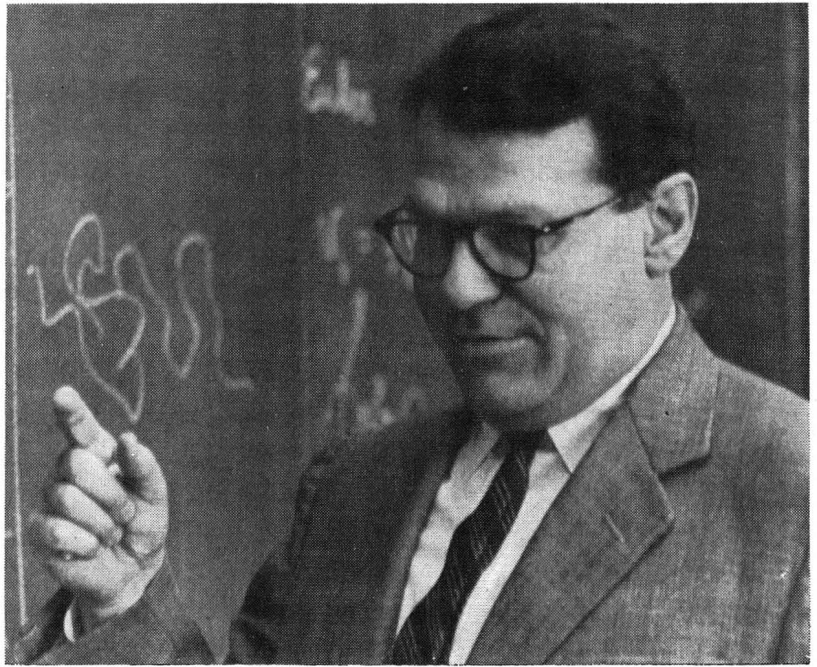
DICK WILHELM of PRINCETON

lum based upon this philosophy make it a difficult one to refute. The population of "Wilhelm Ph.D.'s" in Chemical Engineering faculties all over the country is well known, and their productivity attests to the contagiousness of Dick's enthusiasm for new research ideas. Perusal of 1967 issues of *A.I.Ch.E. Journal* showed an average of 1½ papers per issue authored by former Wilhelm students. No less than eight of the major awards of the A.I.Ch.E. have been accumulated by Dick and two of his most distinguished former students.

From the picture presented above one could infer that being in the presence of Dick is a bit similar to standing in close proximity to a tirelessly bubbling pot that is constantly active and frequently overflowing with ideas. This picture is not entirely wrong. However, the longer one observes Dick the more firmly one concludes that any simple description of his personality and mode of action is bound to be seriously in error. He has a system of built-in checks and balances that serve to give him an overall personality of careful deliberateness. He views each product of his efforts as a contribution that should have permanent value. It is a cause of occasional chagrin of coworkers with him on committees that the criterion of permanence is applied as seriously to committee memoranda as it is to scientific papers.

Dick's students will describe the labor that went into every phrase of any paper that they coauthored with him. They will tell you how, after the nth draft, their mentor would say, "Now we'll go over it again and go on a 'the' hunt to remove each unnecessary article." He constantly views his writing, and that of his students, from the standpoint of the reader. No student of recent years will get a thesis approved without what Dick has coined a "Congressman statement." Translated, this means a paragraph that will render the essence of the thesis intelligible to any nontechnical but interested reader.

. . . the primary function of the university is to teach and its most important focus of education should be on the undergraduate.



The evolution of Princeton's current undergraduate curriculum is an excellent example of the way in which Dick's combination of creativity and deliberation has worked to the advantage of those under his influence. A fundamental cornerstone in Dick's educational philosophy has been that the primary function of the university is to teach and that its most important focus of education should be on the undergraduate. Therefore, when the Department undertook to revise its undergraduate curriculum, he applied the twin techniques of analysis and synthesis that he has used so successfully in his research. Rather than consider each course individually, making whatever changes seemed appropriate, Dick began with the premise that no courses existed in their own right. The faculty sat down and deliberated on what the total content of a four-year program should be. This was done in a very detailed manner, keeping in mind that while many students do choose to continue their technical education through graduate study, others upon graduation go to schools of business administration or enter industry directly.

When the complete outline was obtained, the faculty was divided into teams of two or three, each having the charge to discuss one phase of the subject matter, e.g., physics, with the appropriate service department. These teams then reported to the faculty as a whole which of the various topics in the basic outline seemed adequately covered elsewhere, and which would have

to be supplemented by departmental instruction.

These topics were then interleaved with the subjects of a professional nature, some were noted as essential and others of a suitable elective nature, and then the whole program was restructured into separate courses which, taken in their proper order, would provide the student with a logical and organized program of study.

This process took over two years, but it resulted in a program which experience proved to be highly satisfactory. However, even as this job was being finished, a program of continuing review was established so that the curriculum would maintain its high calibre.

One would expect that a person with the enthusiasm and ability of Dick Wilhelm would be sought after for many consulting assignments and would be the recipient of numerous awards and other honors. Such is indeed the case with Dick, as a glance at "Who's Who in America" will verify. But these achievements have had an impact far greater than the sum of individual accomplishments because of Dick's desire that his ideas have an impact upon people. That wish may be the real key to his success with students, whether they be at the postdoctoral or undergraduate level. Because of his concern for the interaction between ideas and people he could be justly described in an accolade from the town of Princeton as a "humanist in engineering." In these halls that is an appellation not lightly bestowed.