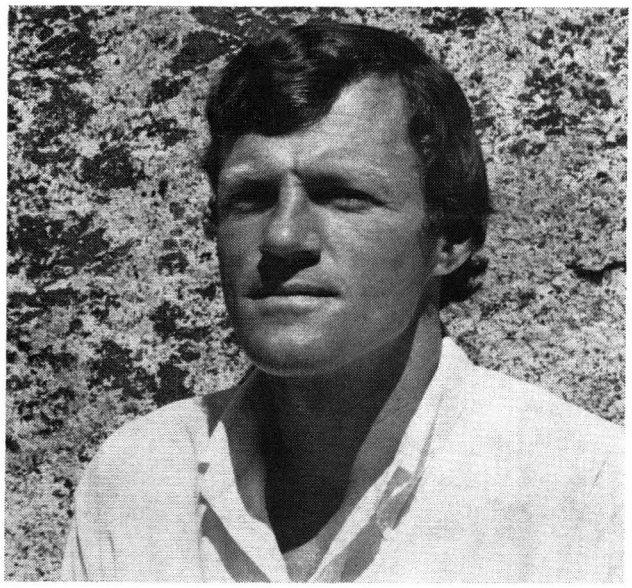
**ChE educator**



*This article was submitted to CEE by J. M. Smith of the Chemical Engineering Department of the University of California at Davis.*

**Underneath lay the perplexing question of how to incorporate a rigorous treatment of fluid mechanics into the chemical engineering program . . . and move logically to a problem solving technique with which the practical problems of engineering could be solved with confidence.**

# *Steve Whitaker of*

# CALIFORNIA AT DAVIS

IN CARMEL-BY-THE-SEA there once lived a blacksmith who fashioned hot iron into wondrous objects while a son watched wide-eyed and took note of each step as drill stock was fashioned into candlestick and sheet iron into weather vane. But the Golden Bear from Berkeley beckoned and an artisan was lost from the diminishing ranks of "smithies" in order to swell the ranks of another Smith. So it was that Steve Whitaker began his undertaking as a chemistry major at Berkeley when that campus was known for its grassy glades, the pleasures of Strawberry Canyon, and a clear view of the now disappearing San Francisco skyline. A persuasive upper classman, "Skip" Scriven, effected the change to chemical engineering while also demanding participation in the Sunday afternoon volleyball game at Bowles Hall. Ever since, these two activities have been interfering with each other, one always diminishing the success of the other.

In 1954 Steve Whitaker started his graduate studies at the University of Delaware working with Professor R. L. Pigford on the problem of interfacial resistance to gas absorption. The results of that study have remained anonymous, but the view of ubiquitous Bob Pigford was inspiring and Professor Whitaker's long-time interest in interfacial phenomena can be traced to that early encounter with the subject. When life in the laboratory became too gruesome, Scriven was always waiting with the Delaware Engineers volleyball team, ready to sally forth to do battle with the Four Corners Tuesday Night Recreational Volleyball Club. Lee Brown offered fantastic sailing on the Chesapeake Bay and was brave enough to let novice Whitaker handle the main in a howling October gale. After an hour of clinging to the side of Lee's capsized boat, Whitaker was relegated to crewing for Mary Wilkenson who was fast enough at the tiller to offset the many blunders made by her crew.

After completing graduate work in 1958 Steve Whitaker moved to the nearby Du Pont Experimental Station and began working in the area of fluid mechanics while attending Jim Carberry's weekly seminars on casuality and modern man — the study of an evolutionary society. Although his PhD thesis dealt with the use of frequency-response techniques to study interfacial mass transfer, Whitaker's graduate school experience left him with the impression that fluid mechanics was the weakest link in the chemical engineers training, and his research at the Engineering Research Laboratory provided an opportunity to study this subject. A confused attitude prevailed until visiting lecturer Bob Bird

**California provided Steve the opportunity to renew his acquaintance with the High Sierra.**

provided one of his inimitable multi-colored presentations, and the elements of transport phenomena were unfolded across a sixty foot blackboard. Bird's ideas were in marked contrast to the pragmatic attitude at Du Pont where engineers struggled to describe the vagaries of the real world in terms of a finite number of previously derived equations. A more attractive alternative was lurking in Bird's comments; namely the ability to analyze any and all real processes in terms of the finite set of *laws of continuum physics*.

A brief discussion with George Bankoff at an AIChE meeting in Mexico City eventually led to an appointment on the faculty at Northwestern University in 1961, and there Whitaker's understanding of fluid mechanics began to take on some recognizable form. This was due in no small measure to the necessity of explaining the subject to the undergraduates, and to endless discussions with John Slattery. Interest in surface phenomena, generated by the work with Pigford, led to a series of research efforts on the fluid mechanics of interfacial phenomena, while the persistant nagging by Slattery about the inadvisability of using Darcy's law for two-dimensional flows led to a permanent interest in the subject of transport processes in multi-phase systems.

LIFE AT NORTHWESTERN was not all academic, and dream of glory nurtured by earlier victories with the Bowles Hall Chargers and the Delaware Engineers, led Professor Whitaker to join the much-traveled (10,000 miles per year) Chicago volleyball team. While holding records for travel, the Chicago team reached in vain for a national championship. Always finishing among the top ten teams in the country yielded but a mediocre thrill. Sailing on Lake Michigan provided some sport in the off season, and as co-owner with George Brown of an ageless and nameless racing sloop a more definitive competitive position was assumed, i.e. dead last.

Underneath these activities lay the perplexing question of how to incorporate a rigorous treatment of fluid mechanics into the chemical engineering program, and how to structure an approach to engineering analysis that would "begin at the beginning," i.e. the fundamental postulates of continuum physics, and move logically to a problem solving technique with which the practical problems of engineering could be solved with confidence. The crux of the matter seemed to be to break away from the luxury of using previously derived equations, and build directly on the fundamental postulates in their most elementary form.* Calculus, linear algebra, and vector analysis, all standard lower division subjects, would provide the tools if they could only be put to use.

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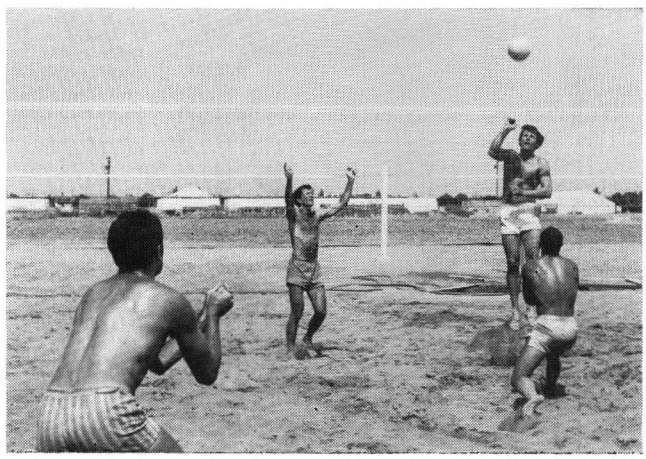

**Lunchtime activity on the UCD sandcourts.**

In 1964 Professor Whitaker returned to California to join Joe Smith's new chemical engineering program at the University of California at Davis. The unstructured nature of the new College of Engineering provided the opportunity of teaching both fluid and solid mechanics in the

* In this respect Bertrand Russell once noted, "The habit of simply assuming results, once one is persuaded they are true, rather than trying to prove them, has all the advantages of thievery over honest toil."

**Steve and Suzanne plus Suzy, Collin Walter, Larry, Lynn and Jimmy on a Sunday afternoon outing.**

common core courses. A few (very few) polite conversations regarding course content and level were always held, but angry debate would more accurately describe the discussions about the common core courses. A heavy dose of "slings and arrows" will usually clear ones head, and Professor Whitaker's thoughts on fluid mechanics were crystallized in the book, *Introduction to Fluid Mechanics,* which had its beginnings at Northwestern. Although the common core courses have essentially disappeared, Professor Whitaker's interest in the undergraduate program has not waned, and an introductory text on heat transfer is currently being prepared.

**Other climbing activities led to an assault on 21,000 ft Mt. Ausangati in Peru and a 28 hour off-route climb of the East face of Mt. Whitney.**

THE RETURN TO CALIFORNIA also provided Steve Whitaker the opportunity to renew his acquaintance with the High Sierra where many a boyhood summer was spent hiking and fishing; however, the population explosion in California had flooded his favorite haunts and heavier loads had to be carried higher and further to avoid the crowds. Charlie Sleicher provided some relief with excursions to the Northwest and the spectacular Ptarmigan Traverse. Other climbing activities led to an assault on 21,000 ft Mt.Ausangati in Peru (failure occurred at 19,000 ft when the tent blew apart), and a 28 hour off-route climb of the east face of Mt. Whitney. Springtime will usually find Steve Whitaker sneaking out of his office early on Fridays, squeezing in three-day week ends with his wife Suzanne at Yosemite Valley where the "big walls" are contemplated, but avoided in favor of the smaller and less strenuous climbs that abound in the valley. The Whitaker boys, Larry and Jimmy, have participated in some small climbs, while the girls, Lynn and Suzy, must wait a few summers before they can join their brothers on the rock. Suzanne views this activity benignly from below, but leads the way when it's time to take the high country trails.

In 1964 Davis was a town without a volleyball team, and like a true devotee Steve Whitaker organized and coached the UCD Volleyball Club during its early years. After 16 straight defeats at the hands of southern California teams, he recognized that coaching was not his game and he threw his talents in with a group of misfits from several northern California cities known as "Friends of Fred." Friends indeed they were not, and the team was known far and wide for its internal strife if not for its ability to win matches. Personal opinions were put aside for the 1970 National AAU Masters (over 35) Volleyball Championships and the team at last managed to bring home the first place medal. In 1972 everyone was two years older and fourth place was the best that "Friends" could do in the same tournament.

While national competition is a thing of the past, the local players are still easy pickings. Fran Woods and Steve Whitaker have never lost a coed doubles match on the UCD volleyball sand courts, and lunch time will usually find Jim Hurley (Physics) and Steve Whitaker tenaceously holding the number one court against an array of frustrated undergraduates. That too must pass, but there will always be a bright-eyed chemical engineering student intent on mastering the laws of physics for some good purpose, and there is much to be done in that domain. □