

## VIRGINIA TECH'S STUDY-TRAVEL PROGRAM

GEORGE B. WILLS

*Virginia Polytechnic Institute and  
State University  
Blacksburg, Virginia 24061*

**W**E WISH TO DESCRIBE our experiences with what we believe is a novel and highly effective Study-Travel Scholarship Program that we have developed for our rising seniors. In addition we would like to acquaint you with our university, since some of you may be uncertain of our geographical location, and many of you will be unsure of our official name.

### BACKGROUND AND HISTORY

**T**HE UNIVERSITY WAS FOUNDED in Blacksburg, Virginia in 1872 as Virginia's land grant university and at that time we were called the Virginia Agricultural and Mechanical College. Later we became the Virginia Polytechnic Institute or V.P.I. In 1970, our name was changed to the Virginia Polytechnic Institute and State University, or V.P.I. & S.U. More simply and popularly, we are known as "Virginia Tech".

The University has 8 colleges and a full-time student enrollment of about 20,000, with about 5400 enrolled in the College of Engineering. This makes us about the sixth largest engineering college in the United States. With a non-student population of 35,000, Blacksburg is located in southwestern Virginia in the backbone of the Appalachian Mountains. Our elevation of 2200 feet not only furnishes us with magnificent scenery but also gives us a superb summer climate of mild

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**George B. Wills** received a B.S. degree from M.I.T. in 1954 and a M.S. from the University of Wisconsin in 1955. After several years at the Mallinckrodt Chemical Works in St. Louis, Missouri, he returned to Wisconsin where he received a Ph.D. in 1962. He was then with the Phillips Petroleum Company in Bartlesville, Oklahoma, until joining the faculty of V.P.I. & S.U. in 1964. His research interests have been in mass transfer and heterogeneous catalysis. He is currently Professor of Chemical Engineering and Chairman of the Departmental Scholarship Committee.

temperatures and low humidity.

Prior to 1937, Chemical Engineering was a part of our Chemistry Department. In 1937 we became an independent department with Dr. Frank Vilbrandt as the first Head. At the time of our founding the department was unique in the College of Engineering in having a graduate program to the Ph.D. level. The second Ph.D. awarded at the university was in Chemical Engineering, the first such degree being awarded in Chemistry. Since 1937 we have been a substantial department with graduating classes ranging from 25 to 90.

### ORIGIN OF THE PROGRAM

**W**ITH THIS INTRODUCTION we now turn our attention to the main subject of describing a study-travel scholarship program that has been developed for our rising seniors. This program evolved from an earlier scholarship program that we established at the freshman level six years ago. At that time our enrollments had reached an

all-time low with the graduating class numbering only in the low twenties. Furthermore, there was a problem with the quality of students that we were attracting. For example, there was a sharp rise in the mortality rate in Physical Chemistry, particularly in the quarter devoted to quantum mechanics, and within the department we noted a disturbing loss in student aptitude and motivation. These low enrollments were of course a part of the national trend at that time, although perhaps we were somewhat harder hit than some other universities.

To address these dual problems of quantity and quality of the undergraduates, in 1975 we initiated what we labeled a "Freshman Merit Scholarship Program." Its purpose was to recruit outstanding high school seniors into our program. The awards were for full in-state tuition for the freshman year and these awards were made solely on the basis of academic merit. No statements of financial need were required and a simple written statement of interest in Chemical Engineering and enrollment in the engineering school were the only requirements for consideration. Selection of awardees was primarily on the basis of class rank and SAT scores, both of which we expected to be in the upper 10%. The program was financed solely by gifts from industrial sponsors and it was highly successful in addressing both the problems of low enrollments and of attracting a high quality student body. In the fourth year of our freshman program, the dean of engineering started a similar college-wide program. Our program was incorporated into the college-wide program and this released the funds that we had been using for freshman scholarships. We decided to divide the available funds into two parts: about half of the funds was to be used for merit scholarship awards at the sophomore level, and the remainder was to be used in a junior level scholarship program, with the nature of this junior level program at first undefined.

There was considerable discussion within the department as to how best use the funds that had become available. An obvious choice was simply to extend the merit scholarship awards into the junior year. However, there was also considerable sentiment for developing what we for a while termed an "opportunity award". Suggested alternatives were expense-paid trips to national AIChE meetings, special short courses which might be available only at off-campus sites, a "retreat" for students which would allow the faculty and invited

guests to interact with the students in an informal atmosphere, and finally, a study-travel experience of some sort. We elected to try the latter proposal and the Dean agreed to help with the funding of an experimental program of this type. The thinking was that many of our fine students had traveled little and that a trip to Europe, coupled with some involvement with educators there, would be a valuable experience. The junior level was particularly suitable because of the structure of our Unit Operations Laboratory. It is a full-time course of five weeks duration taught during the summer. Since summer work opportunities for students are usually difficult to obtain for the remaining half of the summer, a study-travel award for the uncommitted part of the summer was not deemed a serious interference with plans for summer employment.

#### THE STUDY-TRAVEL PRIZE PROGRAM

**I**N THE SUMMER OF 1978 we organized an experimental study-travel program. Those completing their junior year requirements by the end of summer school were invited to apply. We asked



**The Student Party of 1978 with Dr. David Harrison on the right.**

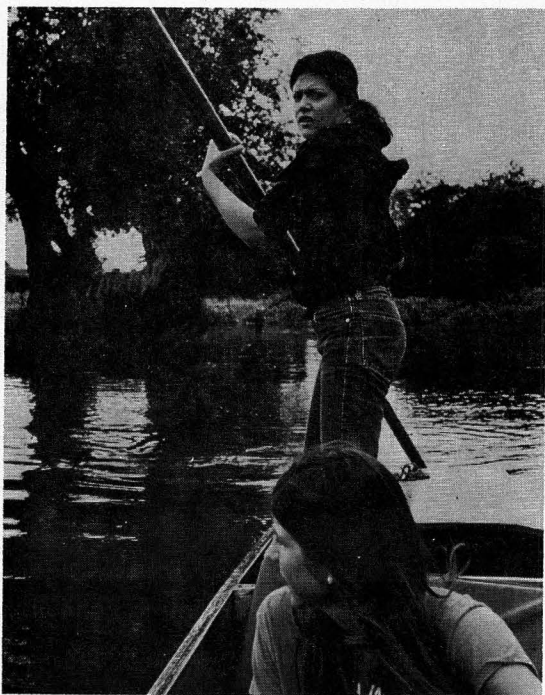
each applicant to submit a biographical sketch together with a short essay outlining how they would prepare for such a trip and what benefits they expected to gain from such an experience. We visited several universities in the United Kingdom, and after some negotiations we arranged for a group of six students to spend a little over a week at the University of Cambridge, to be followed by a week's stay at the University College of Swansea (a part of the University of Wales,



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located in Swansea, Wales.) At Cambridge, the students studied fluidization with Dr. David Harrison. They were housed in the dormitories of Pembroke College (one of the colleges making up Cambridge University) and their meals were also taken there. The academic work consisted of lectures, laboratory experiments, and the independent study of the pertinent literature.

Following the Cambridge visit, the group traveled to Swansea, Wales, where they spent a week studying metallurgical processes. This study culminated in a report which the group presented orally to faculty and students in residence. Their tutor at Swansea was Dean D. W. Hopkins, an authority on metallurgical processes. They also had extensive contacts with Professor J. P. Richardson and other members of the chemical engineering faculty. At Swansea, they and a Swansea graduate student were housed in an off-campus student house consisting of 8 bedrooms and its own kitchen, living room, etc. Their noon meals were taken at the university cafeteria and they prepared their own breakfast and dinner.



Punting on the River Cam at Cambridge.

After the visits to the universities, the group members were free to do as they liked for the remaining two weeks of their stay. Two traveled extensively in France, two toured Germany and Switzerland, and the remaining two spent two weeks hiking and backpacking in the British Isles.

The department paid all on-campus expenses as well as the transatlantic fares. In addition, we furnished each member of the group with a 30-day Britrail pass. The cost to the students for the two weeks on their own ranged from a low of \$200 to a high of \$800. Our costs were a little over \$6000, or about \$1000/student, and this was borne equally by the department and the Dean.

A point of interest might be the composition of this first group. It consisted of four women and two men. This is a fine tribute to the very able group of young women who were recruited in our freshman merit program in previous years, since their representation in the travel group greatly exceeds their representation in the class.

Following the return of the group to the campus, we received most laudatory reports from their tutors. For example, from Cambridge, "Let me say at once what a great pleasure it was to have them in Cambridge. . . The students were interested and competent, open and appreciative . . ." and from Swansea, "It has been a great pleasure to have your six students with us . . . we were very pleased with the work which they did on the project . . . I would like to add that we enjoyed meeting your students socially . . ."

We of course interviewed the returning students and their reactions were clear: they felt that the experience was a superb one. One student wrote, "The education I received both inside and outside of the classroom is one I'll never forget and will always cherish." For some students it was the first time they had traveled independently with the responsibility for making all of the arrangements themselves. This was particularly true of the women. Several of the group had traveled but little, and for one it was the first time on an airplane. Later in the year the group gave a lecture-slide show for the student body and another presentation for aspirants to the continuation of the program. For those of us attending these presentations, the impact of the experience was evident.

#### CONTINUATION OF THE PROGRAM

**I**T WAS DECIDED TO continue the program for another year and this past summer another group

of six students returned to the United Kingdom. They spent about a week at the University College of Swansea and another week at Imperial College in London. This year's group consisted of four men and two women. As before, two weeks were available for independent travel. At Swansea the group's tutor was again Dean Hopkins and this year's topic was an evaluation of competing zinc smelting processes. At Imperial College the group's tutor was Dr. Stephen Richardson (no relation to Professor Richardson at Swansea) and there they were concerned with a computer controlled set of adsorption-desorption columns.

We plan to continue the program again this year, keeping the group size at about five or six. This seems to be an ideal size. It is large enough so that the tutor can lecture without feeling foolish, and at the same time it is small enough to be invited into someone's home. The students are unchaperoned and no academic credit is given. This format obviously places a high level of responsibility upon the individual student and calls for initiative and good judgment on their parts.

#### THE DEPARTMENT'S ASSESSMENT

WE FEEL THAT THE PROGRAM allows our students to penetrate the veneer of ordinary tourism and to interact in a meaningful way with teachers and students from a different culture. To be successful, a program such as this requires a group of highly capable students and we currently have these in unprecedented abundance. We are happy to be able to give recognition to these very fine students and we think that our funds are very wisely spent. □

#### ACKNOWLEDGMENTS

By way of acknowledgment, we wish to thank our industrial sponsors for their generous support. They have been enthusiastic in support of our use of a fraction of their awards for this program. The supporting firms have been: Diamond Shamrock, Du Pont, Mobil, Ethyl, Shell, Celanese, Exxon, Union Carbide, and Union Carbide. Dean Paul Torgersen has generously supported the program from his discretionary funds. Dr. Henry McGee, the department head, has been an enthusiastic supporter of the program as has Dr. Peter Rony, a member of our departmental honorifics committee. Dr. Rony received an award of a somewhat similar type as an undergraduate at Caltech, and he has been an enthusiastic and valuable resource in the planning of our programs. Finally, we would recognize the very fine students who have received the awards. We have placed great confidence in them and they have acquitted themselves well.

## MOLECULAR THEORY

Continued from page 128

$$\nabla^2 n = \frac{d^2 n}{dr^2} + \frac{2}{r} \frac{dn}{dr} \text{ and the boundary conditions for Eq. (5.5) are } \frac{dn}{dr} = 0 \text{ at } r = 0 \text{ and}$$

$n \rightarrow n_B \text{ as } r \rightarrow \infty$ . In the limit of large drops and bubbles the pressure difference  $\Delta P$  between inside and outside obeys the Young-Laplace equation  $\Delta P = 2\gamma/R$ ,  $R$  being the drop radius. As the drops become smaller the above theory shows that this relationship fails, the pressure difference being greatly overestimated by the Young-Laplace equation.

The theory illustrated here for a one component fluid is developed in the course for multi-component fluids and for fluid-solid microstructures. Electrostatic effects are also included so that double-layer and electrostriction phenomena are accounted for. Meniscus shapes, disjoining pressures, and contact angles are investigated also.

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## In Memoriam

### Fred N. Peebles

Dean Peebles was born on April 4, 1920, in Paris, TN. His technical education started at Memphis Technical High School and advanced through bachelors, masters and Ph.D. degrees in ChE at the University of Tennessee. He served engineering education extraordinarily well as professor, department chairman and dean at the U. of Tennessee. During his career, he received numerous awards for his contributions to the University, the community and the engineering profession. He was a member of numerous professional and honorary societies and was the author of many scientific articles. His generosity of spirit infused his institutions' commitment to expanding dramatically the opportunities for minorities to enter the engineering profession. Loved by faculty and students alike, Fred gave unstintingly of himself in assuring their proper development and personal well-being.