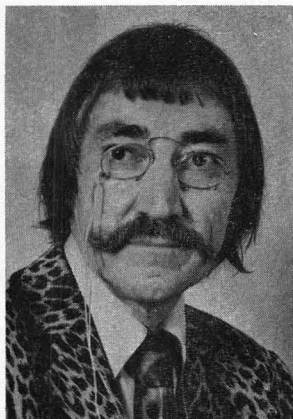


# TRANSPORT PHENOMENA IN THE DELAWARE

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The Great Canoe Outing on the Delaware River sponsored annually by the Department of Chemical Engineering of the University of Pennsylvania has become one of the rites of Spring in the Eastern United States, fostering intra-university, inter-university and university-industry communication, and providing fellowship, recreation and occasional sunburn, poison ivy, indigestion, blistered hands and sore muscles.

This annual event began in 1969 when Professor R. Byron Bird of the University of Wisconsin was invited to give a talk in the Faculty-Graduate Seminar Series at the University of Pennsylvania. He declined the accompanying challenge of a tennis match with one of the Penn



After receiving bachelors degrees in both mathematics and chemical engineering at the University of Michigan in 1942, **Stuart W. Churchill** worked for the Shell Oil Company and the Frontier Chemical Company. He returned to Michigan in 1947 for graduate work and remained as a faculty member, serving as Chairman of the Department of Chemical and Metallurgical Engineering from 1962 to 1967, when he joined the University of Pennsylvania as the Carl V.S. Patterson Professor of Chemical Engineering. His current research interests are in combustion and natural convection. "Inertial Flows," the first of a series of monographs he is preparing under the general title "The Practical Use of Theory in Fluid Flow and Heat Transfer," has just been published by Etaner Press. His publications also include "The Interpretation and Use of Rate Data—The Rate Process Concept" by Hemisphere and over 150 technical articles in journals.



**The Eagle and Eaglets on the Delaware**

faculty members, but responded favorably to the invitation of Arthur E. Humphrey to go canoeing. Art, then Chairman of Chemical Engineering, later Dean of Engineering at Penn and now Provost at Lehigh, made all arrangements and provided enthusiastic leadership, just as he has in all subsequent years. The event has always been held on and in the Delaware River from Dingman's Ferry Slip above Bushkill, Pennsylvania to Kittatinny Point at the famous Delaware Water Gap in New Jersey, 18 miles downstream. The first year only a few Senior and graduate students, faculty members, friends and family members attended. Through the years the troupe has gradually expanded in scope to include students from all classes, alumni and secretaries from Penn, and faculty members from many of the schools in the area, including Carnegie-Mellon, Drexel, Delaware, Lehigh, and Princeton. Participants have frequently come from the AIChE and the National Institutes of Health and from as far away as Michigan, Israel, Guatemala and Kazakhstan. Professor Lee C. Eagleton [see Figure] and his colleagues at Pennsylvania State University have been regulars.

The aforementioned stretch of the Delaware River Valley is usually bursting into leaf and

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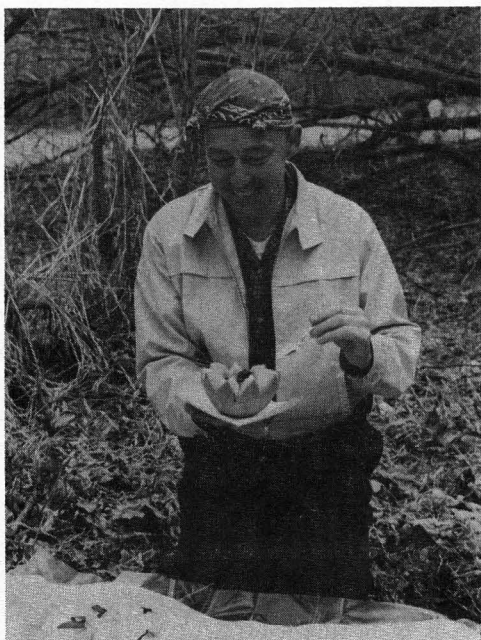
**Bob Bird enlivened the first trip with conversations in French, German, Russian and Japanese and delivered spontaneous lectures (surreptitiously tape-recorded) on various topics including the J-stroke, bursitis, irreversible phenomena and the length of the sine curve traced by some of the neophyte canoeists.**

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blossom the last Sunday in April but is still relatively deserted by mankind except for a few shad fishermen (who openly deprecate the intrusion of a noisy parade of canoes). The water, recently freshened by the melting snow of the Pocono mountains, is usually swift enough to minimize the effort of paddling unless there is a strong headwind. White water is limited to a few short stretches.

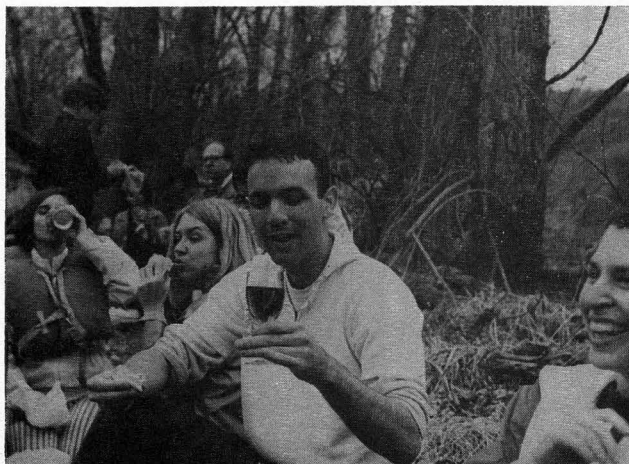
The trip is broken midway for lunch on Pocono Island. Individual luncheon fare varies from the like of champagne and caviar served on an especially embroidered tablecloth to diet coke and hot dogs on the bare grass, but beer remains the staple.

The outing is not officially a race, but the exuberance generated by the beverages and the end of classes at Penn usually fosters some informal competitive paddling on the downriver stretch. Each year has seen at least one ducking in the cold waters of the Delaware but no one has yet been lost. The spirit of Spring inevitably tempts one or more couples to explore the wooded shore, thereby delaying their arrival at the finish to the point of alarm.



**Honored Guest R. Byron Bird**

Bob Bird enlivened the first trip with conversations in French, German, Russian and Japanese and delivered spontaneous lectures (surreptitiously tape-recorded) on various topics including the J-stroke, bursitis, irreversible phe-



**Warren Seider Makes a Toast**

nomena and the length of the sine curve traced by some of the neophyte canoeists.

Each year since 1969, a distinguished chemical engineer has been invited to attend the Great Canoe Outing as Honored Guest and deliver a talk at the Penn Faculty-Graduate Seminar the following day. These guests have included Professors Edwin N. Lightfoot, Dale F. Rudd, Camden A. Coberly, Warren E. Stewart and Thomas W. Chapman, all of the University of Wisconsin, Professor James J. Carberry of the University of Notre Dame, Professor Edward L. Cussler, Jr., of Carnegie-Mellon University and Professor H. Scott Fogler of the University of Michigan.

Professor Lightfoot commemorated his participation in the Great Canoe Outing of 1970 with the gift of a brightly painted canoe paddle graced with the jingles:

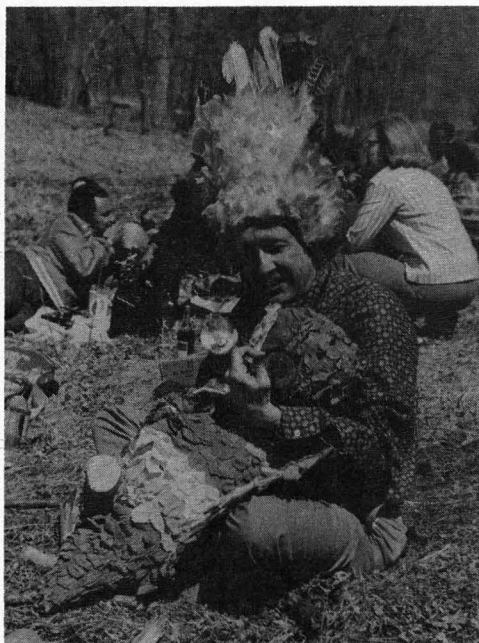
**A HEMULEN AT HEART**

Your host is a pusher named Art  
Who believes in an organized start,  
and lest you relax  
to rest aching backs  
You must portage before you depart.

#### THE TIE-ON DEAL

Penn harbors a hatter named Stu  
Who thinks that in every canoe  
with beauty and lunch  
should be a gay bunch  
Of hats that small bats could fly through.

In return he was presented with a headdress and *Birdsfoot* [see Figure]. This paddle has subsequently been designated as the *Edwin N. Lightfoot Up-the-Delaware-without-a-Canoe Paddle*, and each year is inscribed with the name of the outstanding performer or performers during the out-



Ed Lightfoot with Headdress and "Birdsfoot"

ing. It was awarded retroactively for 1969 to Hiroyuki Ozoe who steered a three-man canoe deeply into the reeds of a backwater during a competitive sprint to the finish line. In 1970 it went to Mike McKetta (Johnny's son) who went to the extreme of seizing and throwing away a paddle and finally trying to overturn the canoe occupied by the Honored Guest rather than be passed. In 1971 Peggy Lempa and associates earned the honor by all three falling in the river while embarking and then, after they had dried off and resumed, being swamped and overturned by the wake of a motor boat. The 1972 winners were Aaron and Tina Weiner who chickened out in a stretch of white water, beached on an island and abandoned their canoe to the river. Its empty appearance frightened everyone and forced Art Humphrey and Cam Coberly (the Honored Guest)

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to paddle and portage upstream for their rescue; thereby being designated as winners in advance for 1973.

Other winners of the Lightfoot Trophy include Renate Treibmann, who lost her paddle between the canoe and a boulder only to have it fly into the air and directly into the hands of another canoeist; Bob Dedrick and Bob Lutz, who proudly demonstrated the superiority of kayaks by turning complete circles around canoe after canoe as they passed them; John Goepp who "accidentally" overturned twice while secretly wearing a wet suit; Andrew diLemmo who demonstrated his Tarzan technique by swinging on a huge vine throughout the lunch break only to discover that it was poison ivy; James J. Carberry, who as the Honored Guest, arrived a day late, perhaps taking to heart the outing motto of that year by his idol Dante Alighieri—"Lasciate ogni speranza voi ch'entrate"; and an anonymous canoeist who fell in, frightened everyone by failing to resurface, and was subsequently discovered to be hanging on desperately in the air pocket under the overturned canoe.

The U.S. Army Corps of Engineers has long plotted to dam the Delaware River at Tock's Island, just above the Delaware Water Gap, thereby turning the site of the Great Canoe Outing into a reservoir. This threat now appears to be postponed indefinitely in deference to the environmentalists, but has been replaced by another. Our recent departmental chairman became addicted to long-distance running, and in 1978 he and several students split from the canoeists at lunch time and ran the remaining 9 miles along the New Jersey shore. Naturally they were forced to abjure the amenities of food and drink on the island and to leave their canoes to be ferried down the river by others. This diversion was repeated in 1979, and only time will tell whether or not the Great Canoe Outing will be supplanted by a Delaware Water Gap Mini-Marathon.

All chemical engineers and friends everywhere are welcome to join us some year on the Great Canoe Outing (and/or Run). □