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"THE FUTURE OF APPLIED MATHEMATICS"

25th ANNIVERSARY CELEBRATION SPEECH: THE DIVISION OF APPLIED MATHEMATICS

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Genesis. In the beginning, thirty years ago, in the United States, solids were without form, and void, and darkness was upon the face of the fluids.

And Dean Roland George Dwight Richardson said, "Let there be a Program of Advanced Instruction and Research in Mechanics at Brown University." And it was so.

And he brought forth teachers: Prager and Synge and Brillouin and Schelkunoff and Feller and Bergman and Sokolnikoff and still others.

And he brought forth students: Diaz and Handelman and Pell and Greenberg and Jerison and Brock and Springer and Dorothy Brown and Chiarulli and Theilheimer and Vaszoni and still others.

And they saw that Mechanics was good, and it prospered and multiplied.

The solids of the earth were separated into elastic and plastic and the fluid waters were separated into incompressible and compressible.

And there was light and there was thermodynamics.

Reminiscences. Let me remind you of the sights and sounds of thirty years ago.

Classes were held in an old building of the Rhode Island Historical Society called the Cabinet. There were heads in the basement and busts. Those terms of course had a different meaning then. We were very straight. The closest thing to a hippie was Paul Nemenyi in bare feet and long hair, asleep in a Faunce House chair.

Charles Loewner had an office in the Cabinet at the door on the right as you went in. Clifford Truesdell was on duty at a desk at the door. Stefan Bergman was telling us in class about the magic of "punch cards" and "punch-card machines" and running to Boston to try to get help in computing his E-function. Hilda Geiringer leaned against the desk and lectured and everyone wondered if she was really Mrs. Mises.

World War II swirled around us. Everyone of us was up for grabs in the draft every six months. Joe Diaz and I learned to shoot hand guns from a marine sergeant in the basement of the gym and were deaf for two days.

A freezing winter and a shortage of oil. No heat in the graduate dormitory over Christmas vacation. We burned the extra chairs in the fireplace and then went across the street and tore down the fence for firewood. There were always mice in the waste-baskets.

The Office of Scientific Research and Development, where research and security meant being locked in Dean Richardson's office with George Handelman for a weekend while preparing a nomogram. The nomogram was for calculating the probability of clearing beaches of mines by aerial bombing prior to the invasion of Europe.

Wilfred Kaplan and George Hay and the rest of us working on gun-sights in locked rooms in the Cabinet.

Witold Hurewicz, the topologist, ogling the secretaries in the Dean's office and showing me how to work out the periodic motions and stability criteria for a non-linear system of a spring and hammer colliding with a wall; a device to acoustically detonate underwater mines.

Going to Newport with Prager and watching PT boats fire torpedoes at the light-weight nets we designed to absorb energy. These were to replace the heavy rigid ones which were so hard to transport and so easy to penetrate. No admiral believed the results, of course.

Walking into Faculty House and being told Roosevelt had died. Then the day in Faunce House in 1945 a few weeks later when we read about the explosion of an atom bomb over a place called Hiroshima and we finally figured out what our graduate room-mates in Chemistry had been doing at a place they called Dogpatch in Oak Ridge, Tennessee.

Offices in the Engineering Castle. Research meant running a Marchant calculator and doing India ink drawings as well as applied mathematics. It was hard to keep up with Prager. You would come in at 9 o'clock and find a neatly written 10-page mathematical analysis that had been dropped on your desk at eight o'clock that answered all of the previous day's questions. It took all day to catch up and there would be another 10 pages the next day.

The post-war period. The invention of the research contract. The Navy, the Watertown Arsenal. The Office of Naval Research, Mina Rees, Joe Weyl.

Petitions in Faunce House for Wallace (Henry, not George). Voting for Wallace instead of Truman as a protest and then being delighted when Truman won over Dewey.

The establishment of the Graduate Division of Applied Mathematics on Brown Street. Sharing an office with Bill Pell. The fluids men—Carrier, Lin, Chiarulli, Lewis, Isenberg, Roberts, Ostrach, Ehlers, Karp. The solids men—Prager, Drucker, Greenberg, Symonds, Lee, Malvern, Meacham. John Marchant with guns in his desk. Tony Biot—theoretician and partisan. A party at the Prager's on Hope Street. Ann Prager serving cakes and tea. A wedding party for Lin at the Division. George Carrier doing magic at the blackboard and at the pool table.

Exodus. It was a good time for students of applied mathematics and our expectations were great. We thought of the applications of mathematics in narrow terms, but we did not know it. Few, if any of us, doubted that applied mathematics was the wave of the future.

Interdisciplinary? That meant going from elastic deformations to plastic ones—or introducing viscosity into a flow.

We did not foresee the multiple dimensions of the applications of mathematics in fields far from classical physics. We have learned this lesson now.

Nor did we understand the significance of the changes taking place in mathematics itself. The elegance and power of modern algebra, topology and analysis were needed and were applicable. We are learning this lesson too, now.

But from 1945 to 1965, while the banner of pure science flew high, we were disappointed that applied mathematics was not accepted as we had expected it to be.

I began with a paraphrase of Genesis. Let me continue in a biblical vein with the words of Exodus:

"Now there arose a new king over Egypt who did not know Joseph." These words might be used to describe the public attitude today toward pure science pursued for its own sake.

I think we all believe that the applications of mathematics can lead mathematics into a new period of significance in human affairs and into a new period of mathematical discovery.

So I wish to say that the group meeting here has cause not only for satisfaction looking over the past, but cause for optimism looking at the future.

I would like to propose a toast:

To Bill and Ann Prager and to the men and women of 30 years of Applied Mathematics at Brown: As they were and as they are, may they long continue to be!