Timothy O'Meara (1928-2018), Provost Emeritus, Notre Dame University
In Memoriam, Monday, June 18, 2018

The passing of Tim O'Meara is a very sad event. If there is one silver lining, it is the opportunity that it gives us to recall and celebrate him. There is so much to say; there are so many lives that he touched. My brief remarks are intended to give a sense of the impressive human being that he was.

By the early 1960s, Tim had been personally recruited from Princeton to join the mathematics department of the University of Notre Dame by its president Father Hesburgh. I first met Tim shortly thereafter when I came to Notre Dame to pursue graduate studies in mathematics. I wanted to pursue differential equations, a glorious subject that lies at the heart of the explanation of many things from the understanding of suspension bridges, to suspension systems, to knowing the way the planets move, to maneuvering spacecraft around in the solar system, and so on. But not long after arriving at Notre Dame, I heard Professor O'Meara (back then, I assure you I called him Professor O'Meara) lecture about numbers and groups. It was alluring, it was compelling and exciting, and it was perfect. But it was more O'Meara than the subject.  He was transparent, energetic, disciplined, he had charm, and a sense of humor. It was clear to me that I had to follow, and it did not really seem to matter where. When he told me that he did not mollycoddle his students, I had to rush to the dictionary, but I forgot all about differential equations and became his student.

Just before Professor O'Meara would close shop in the department---usually late in the evening---he would do the rounds. He'd pace through the corridors of the then math department (now Notre Dame's IT center), heels clicking loudly, in search of his doctoral students (Larry Gerstein, Ed Connors, Arnie Johnson, Marty Dull, and Norbert LaCroix among them. Bill Frascella was there too but in his pursuit of logic, he had a different agenda).  Having found one of his students, Professor O'Meara would ask: "Mr. Johnson, what theorems have you proved since I saw you yesterday?" This was pressure!  One simply had to have something to say, even if it was only a carefully camouflaged and repackaged version of the answer from the day before. It was intimidating, but in a healthy inspirational way. Had we known about the successful ultimatum that his wife Jean presented to Tim shortly before they got married: "it's either me or the motorcycle" we would have been bolder. (A powerful 1.0-litre "Black Shadow" had been Tim's constant companion. He rode through large swaths of South Africa, Europe and the US on it.) Once Larry Gerstein did get bold and tried to steer the conversation into a different direction.

"Do you ever do any exercise Professor O'Meara?" With a touch of disdain, the answer shot back: "I exercise my mind, Mr. Gerstein."

Since it had been Tim's passion for many years, I should next give you a little bit of a flavor of the mathematics that he pursued. You're all familiar with the Pythagorean Theorem $x^2 + y^2 = z^2$. If you put the $z^2$ to the other side, you get $x^2 + y^2 - z^2$. This is a very simple quadratic form in three variables. This can get complicated. You can have any number of variables, infinitely many variables, variables that are intertwined in complex ways, and so on. Let's shift contexts. If you want to understand a human being as a physiological construct you have to understand the person's DNA. Two people are physiologically the same if they have the same sequence of DNA base pairs. What in the human context is DNA is for quadratic forms a set of invariants. In the human being, the DNA sequence is already there, but (until recently) painfully laborious to identify. In the situation of quadratic forms, the invariants have to be first invented and then shown to be a complete list. Tim O'Meara completed the invention of a full list of the local invariants for quadratic forms. Why only local you say? Aah, but there is the so-called "Hasse principle" that tells you that two quadratic forms are the same globally if and only if they are the same everywhere locally. Do you see it? Tim O'Meara had made a major contribution to a study that was started by the Greeks 2500 years ago (actually the Babylonians), that has remained central in mathematics ever since, and that has attracted the contributions of many great mathematicians, Legendre, Hermite, Gauss, for example.

Tim's book on this subject "Introduction to Quadratic Forms" was recently reprinted in Springer-Verlag's Classics of Mathematics Series. One reviewer informs us as follows: *Anyone who has heard O'Meara lecture will recognize in every page of this book the crispness and lucidity of the author's style and the superb organization and selection of material. It would be interesting to speculate on the subject O'Meara will next choose to unify and expound upon in his own elegant style.* This subject turned out to be the classical groups over number theoretic domains. Infused by his ideas, Tim put this theory on a new footing and extracted important new information in the process. (This is the mathematical domain in which I would later labor happily for thousands of hours.) Not surprisingly, the recognitions came Tim's way. Grants from the National Science Foundation, the Endowed Kenna Chair of Mathematics at Notre Dame, the appointment as Gauss Professor at one of the great citadels of mathematics, Germany's University of Goettingen, just to mention a few.

But it was not at all only about his mathematics. Tim served as chair of Notre Dame's Mathematics Department in the 1960's and 1970s (even though he had seen to it that his Notre Dame contract stipulate that he should be free of any

administrative duties). The Notre Dame Mathematics Department was a very good department before Tim arrived. Strong mathematicians with a passion to communicate this powerful art, made for a very rich and supportive environment. John Derwent, Abraham Goetz, George Kolettis, and Wilhelm Stoll, were already there. Tim set out to much improve its strength in the field of abstract higher algebra by inviting Barth Pollak, Carl Riehm, and Warren Wong to join the department. (A word of thank you to John Derwent on this occasion for getting several of us together for our bimonthly chats with Tim during the last few months. Tim's mind remained razor sharp to the end.)

Tim took great pride in supporting and developing the Mathematics Library. The life-blood for any mathematician then (not so much anymore, given online electronic publishing). Tim saw to it that our library had a complete palette of journals. With Tim it wasn't just the larger picture. He was also very much a man of detail. For example, he had the math library use a "traffic signal approach" to tag the new journals that came in. "Green" if an issue just arrived on the shelf, "yellow" if it had been there for a week, finally "red" if it was about to disappear to the back shelves. It pleased Tim a great deal when the university rededicated the math library in his name to honor his contributions to the department and the university. Always interested in communicating mathematics to undergraduates, he also revamped a multi-sectioned, elementary calculus course, by introducing a historical element. After all, should not a Notre Dame student know about the giants of the scientific revolution, Galileo, Kepler, Tycho, Newton, for example.

Tim had a tremendous nose for things in general. You'd walk with him down the corridor of the math department, you'd encounter some colleagues, and after they passed he'd turn to you and say "What's wrong with Jack?" even though all seemed entirely normal. "What do you mean, what's wrong with Jack?" Three days later, you'd find out that Jack had some serious issues to deal with. Under other circumstances, Tim would have asked "Jack, what's new?" with amazing results. Jack would have opened his heart, soul, and mind, and poured out all his inner thoughts to him.

When Father Ted Hesburgh was looking for a new provost to execute his ambitious vision for Notre Dame, he found his man in Tim O'Meara. Tim, working with presidents Ted Hesburgh and Monk Malloy realized well that heightened national and international recognition for Notre Dame could only come as a consequence of stellar scholarship produced by prominent Notre Dame intellectuals. Thus he made "superior scholarship by a superior faculty" his Leitmotif throughout his almost 20 years at the helm of Notre Dame's academic enterprise in the 1980s and 1990s. We all know that he pursued this theme with characteristic skill and at full throttle and that he had significant success. In the

highly competitive environment of American higher education, the rankings of Notre Dame's departments improved across the board. (As necessary first step along the way, he greatly advanced faculty salaries.) Tim ran the university's academic enterprise with a small staff of extremely dedicated people: Kathleen Cannon, Isabel Charles, Eileen Kolman, and Pat Laskowski are four of them. He appointed deans with qualities that paralleled his academic vision and that served as exemplars for his mantra "superior scholarship by a superior faculty." David Link, Frank Castellino, Tony Michel, and Roger Schmitz were four of them.

Tim also opened Notre Dame to China, starting faculty exchanges, cultural exchanges, relationships with leading Chinese educators and institutions. (It may surprise you to hear that Tim had something in common with Richard Nixon.) Guangzhong Chen was one of the beneficiaries of this relationship. (Tim enabled him to leave China and to study mathematics in the Unites States). Chen wrote me a note recently that reminded me of Tim's incredible work ethic. As he put it "I remember one day in 1988, there was a football game with Miami and we won! The whole campus was like a pot of boiled water through the afternoon to the evening. When I came back from the Library to Bronson Hall I saw that the light in Professor O'Meara's office was still on, so I called him and we talked for a few minutes about the game, then he also asked me about my study. It was something like 9 pm and he was still at work!"

Finally and importantly, Tim was a man of the Catholic faith and he reflected about his faith both deeply and broadly. Some of his reflections he would put to pen. "I have been fascinated with the mysterious interplay between good mathematics and reality. Consider, for example, the lines, triangles, squares, and circles of Euclid. These are examples of forms that occur to us through our experience in nature. People - mathematicians - then study relationships among all sorts of these forms in increasing degrees of abstraction based only on the intrinsic harmony which is found in the relationships that unfold. Centuries later, some of the relationships derived in a world of total abstraction, in hyperspace, as it were, come back to earth and allow us to explain nature or even to change it. There is an intrinsic harmony then between mathematical forms, nature, and the mind. That is what I find fascinating. That is what I find mysterious. Take yourself back in time and imagine the mathematics of the Babylonians, leading to the discovery of algebra by the Arabs in the Middle Ages, ultimately providing Newton with a framework for the calculus and his force of gravitation which finally explained what held the heavens in their place. So far as I am concerned if these are not visible signs of the hand of God at work then I would like to know what is."

Of course, I could go on … and on. In sum, for me, of all the people that I have gotten to know up close in my life, Tim was the most impressive. He was razor

smart, eloquently articulate, inspirational, with a sense of humor, discipline, and lots of charm.

Thank you, Tim, for being a part of our lives, thank you for making them all so much better and so much more interesting. We know that you're already smiling down on us from the much better place that you already inhabit.

Alexander Hahn
June 22, 2018