Professor Lim Deok-sang of U.S., contributor to modern mathematics

Significant achievements in development of algebraic geometry through research on finite group cohomology and variation theory
Serving Korean community, including position as president of Korean Association and contributions to Korean-American Scientists and Engineers Association

The Overseas Koreans Agency (Commissioner Kim Kyung-hyup) has selected professor Lim Deok-sang (1928-1982), a first-generation Korean American mathematician who made significant contributions to the development of modern mathematics, as the Overseas Korean of the Month for November.

Born in Kaesong, he enrolled in the first class of the Department of Mathematics at Seoul National University in 1946. That year marked the establishment of Korea's first mathematics department at Seoul National University and the founding of the Joseon Mathematical and Physical Society.

The chaos of the Korean War and impoverished living conditions prevented him from focusing solely on his studies. Working as a teacher at Kaesong Girls' High School to earn living expenses and money to cover tuition fees while pursuing his studies, he was only able to graduate eight years after enrollment. He later taught at Ewha Girls' High School before departing for graduate studies in the United States in 1955, embarking on his path as a mathematician.
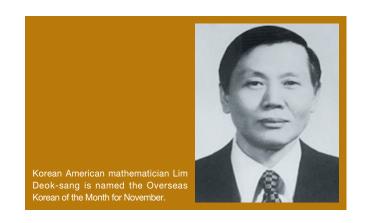
He published remarkable research achievements in algebraic geometry, the field studying the properties of geometric objects expressed as equations, and made significant contributions to the development of algebraic geometry.

In 1957, he earned his Ph.D. from Indiana University in the U.S. with a dissertation titled "Research on Cohomology Theory of Finite Groups."

Cohomology of finite groups refers to a core mathematical tool for understanding the structure and algebraic properties of groups. As an important theory bridging algebra and topology, it is essential for analyzing the structural characteristics of various finite groups.

He then served as an assistant professor at Columbia University in the United States. There, he developed the classification theory of modules defined over finite groups, laying the foundation for the then emerging mathematical field of algebraic K-theory. His work also significantly influenced geometric topology.

First Korean professor at Ivy League university, also pioneered development of modern Korean mathematics

Korean American mathematician Lim Deok-sang is named the Overseas Korean of the Month for November.

In 1959, through his paper "Modules over Finite Groups," he solved a major problem in Cartan and Eilenberg's homology algebra, which was a significant topic of interest in the mathematical community at the time. He astonished the global mathematical community by establishing a classification theory for modules defined over finite groups. The central theorem of this paper proved that, for π defined as a finite group, even modules based on a ring of integers $Z(\pi)$ must have finite projective dimensions and the module's cohomology must be self-evident, and that these have a necessary and self-sufficient relationship.

Professor Oscar Goldman, then chair of the mathematics department at Brandeis University, highly valued Lim's mathematical talent and research ability, recruiting him to the university in 1960. Hired as an associate professor for five years, he devoted himself to teaching and research. In 1965, he was appointed professor of mathematics at the University of Pennsylvania, becoming the first Korean mathematics professor in the Ivy League. He later served as the chair of the Graduate Mathematics Program (1974-1975) and the chair of the Mathematics Department (1975-1978) at the university.

He published his research findings in the "Seminar Notes SGA 7" of French mathematician Alexander Grothendieck, who is considered one of the greatest geometers of the 20th century. The

paper is regarded as a classic work laying the foundations of modern algebraic geometry.

He maintained deep bonds with world-renowned scholars, co-authoring a book on deformation theory with Grothendieck, who was his contemporary and also a 1966 Fields Medal laureate. Through Grothendieck's work, the study of algebraic objects (rings and modules) and geometric objects (varieties) became perfectly equivalent, opening the way to tackle difficult problems in number theory using algebraic geometry methods.

Intractable problems in number theory, like Fermat's Last Theorem, which had remained unsolved for centuries, began to be resolved using algebraic geometry. New applications of algebraic geometry, once seemingly detached from the real world, were discovered one after another. This included the use of elliptic curves, which played a key role in solving Fermat's problem, as well as uses in modern encryption protecting personal information on transportation cards.

Professor Lim Deok-sang (far R) of the Mathematics Department at Columbia University poses for a photo. (Provided by the Korean Academy of Science and Technology)

A 1971 interview with professor Lim Deok-sang in the Dong-A Ilbo newspaper

1976, he lectured on algebraic geometry at the university's graduate school for over two years, striving to nurture young scholars and advance Korean mathematics.

In 1971, he was invited by the Korean Mathematical Society to give a weeklong special lecture series. In an interview with the Dong-A Ilbo, he criticized the domestic mathematical community for its excessive focus on applied mathematics. He proposed the direction the Korean mathematical community should take, emphasizing the importance of fundamental mathematics (pure mathematics) and the necessity of support for it.

Selected by gov't as 'Distinguished contributor to Science and Technology of the Republic of Korea'

Lim passed away in the United States in 1982 at the age of 54 before he could fully realize his potential as a mathematician. In 2020, the Ministry of Science and ICT and the Korean Academy of Science and Technology honored his achievements, which made a significant mark in algebraic geometry through his research on algebraic K-theory and modular theory, by selecting him as a "Distinguished Contributor to Science and Technology of the Republic of Korea."

"Professor Lim Deok-sang elevated the stature of Koreans worldwide through his outstanding mathematical achievements," OKA Commissioner Kim Kyung-hyup said. "He contributed not only to the development of mathematics in Korea but also served the Korean American community, enhancing the rights and interests of Korean scientists and compatriots. We designate him as the Overseas Korean of the Month for November so that professor Lim's accomplishments may be widely known and long remembered."

The OKA identifies compatriots who have contributed to the development of the Republic of Korea or to enhancing the status of Koreans in their countries of residence, selecting and announcing them monthly as the Overseas Korean of the Month. Since March, the following individuals have been selected: Kim Pyeong-jin (former president of the Jeju Development Association in Japan), Hong Myeong-gi (former chairman of the M&L Hong Foundation), Im Cheon-taek (independence activist), Park Byeong-heon (former head of the Korean Residents Union in Japan), Park No-hak (former president of the Return of Detained Sakhalin Koreans Association), Lee Ui-gyeong (independence activist), Dr. Seo Se-mo and Chairman Seo Gab-ho. 창

Served as chair of Seo Jae-pil Memorial Monument Construction Committee and contributed to its establishment

Professor Lim was also actively involved in activities for the Korean American community. He served as the fourth president of the Korean Association of Philadelphia (1974-1975), dedicating himself to the local Korean community, and contributed significantly as chairman of the Committee for the Establishment of the Seo Jae-pil Memorial Monument. The monument was erected on land donated by the state of Pennsylvania within a park, funded by donations from Korean compatriots residing in the Philadelphia, New York, and Washington, D.C., areas, along with support from the Korean government.

Furthermore, he served as an inaugural headquarters council member (1972-1975) and inaugural scholarship committee member (1978-1981) of the Korean Society of Engineers and Scientists in America (KSEA), founded in 1971. In these roles, he contributed to fostering exchanges among Korean mathematicians and scientists in the United States and nurturing talent.

Lim lamented the poor state of mathematical research in his homeland more than anyone else. When Seoul National University utilized U.S. foreign aid loans to invite Korean American mathematicians to the college, Lim actively participated. Starting in