

# obituary

## Giulio Natta, 1903—1979

GIULIO NATTA, the eminent Italian Chemist, who died on 1 May 1979, at the age of 76, will be remembered for his discovery of isotactic polypropylene, and for his outstanding researches on the synthesis and structure of stereo-regular polymers. Seldom have such scientific contributions aroused such profound fundamental interest, and his work sparked a volume of research on polymerisation never before approached.

Natta was born in 1903 in Imperia, a small seaside town in Liguria. His father was a well known judge, but contrary to the traditional profession of his family, he did not take up law studies. He was fascinated by chemistry from his school days, and after attending the 'Christopher Columbus' school in Genoa, he studied mathematics at the University of Genoa. He changed disciplines when he moved to the Milan Polytechnic Institute where he took his 'Dottore degree' in chemical engineering at the early age of 21, and his 'Libero Docente' three years later. He was assistant lecturer in chemistry at Milan before he moved in 1933 to the University of Pavia, as Professor of General Chemistry, and two years later to Rome as Director of the Institute of Physical Chemistry. In 1937 he became Professor of Industrial Chemistry at Turin, and finally from 1938 until he retired in 1973, Professor and Director of the Milan Institute of Industrial Chemistry.

Natta's varied professional duties and wide range of research interests equipped him for the remarkable contributions he was to make to polymer science from 1954 onwards. He ascribed the particular conditions, which enabled his research school at Milan to achieve such rapid and conclusive results in the genesis and structure of new classes of macromolecules, to his early experience with X-ray studies of the structure of crystals and the resolution of chemical and structural problems.

At first his investigations were directed to the study of the structure of low molecular weight inorganic substances, but in 1932, following a chance meeting with Professor Hermann Staudinger, he was attracted to the study of the lattice structure of linear polymers. This aspect of his work did not develop very rapidly and he concentrated his X-ray work on the structure of heterogeneous catalysts

used for certain important industrial applications. At the same time he investigated the processes for the synthesis of methanol, higher alcohols and formaldehyde and in 1938 he was invited by the Italian Government and some industrial companies to initiate a research programme on the production of synthetic rubber. The industrial production of butadiene-styrene copolymer rubbers was realised in Italy within a few years and he also developed a purely physical commercial process for the separation of butadiene from butene-1. At the same time he began a series of researches on the applications of petroleum derivatives, and in particular the use of olefins and diolefins as raw materials for chemical synthesis such as the oxo-synthesis and polymerisation.

In 1952 he attended a lecture by Karl Ziegler<sup>1</sup>, the Director of the Max Planck Institute at Mulheim, and was struck by the fact that on reacting an olefin with an organo-metallic compound, Ziegler obtained a dimerisation which resulted substantially in a single product and not a mixture. Afterward he said of the meeting "the knowledge acquired in the field of polymerisation enabled me to appreciate the singularity of the methods that Ziegler described and my interest was aroused".

Natta suggested to Montecatini, Italy's largest chemical company, for whom he was a consultant, that a direct link should be established with Ziegler, so that his work and ideas could be developed. The outcome was that Montecatini purchased rights for the commercial development of Ziegler's work in Italy and Natta acquired access to Ziegler's researches on the transformation of olefins and started researches in Milan on the polyaddition of ethylene with organic aluminium compounds.

In 1953 Ziegler made the momentous discovery of the polymerisation of ethylene to a high molecular weight linear polymer and immediately thereafter concentrated his research on the development of better and more efficient catalysts, whereas Natta, on the other hand was firmly convinced that the Ziegler catalyst contained the key to the regular polymerisation of olefins, dienes and other unsaturated compounds.

It was in March 1954 that he made his great discovery of the stereo-regular

polymerisation of propylene, butene-1 and styrene. Feverish research resulted within a short time in the polymerisation of many olefins to isotactic polymers, propylene to the syndiotactic polymer, ethylene-propylene copolymers and the stereo-specific polymerisation of non-hydrocarbon monomers. The work in his laboratory was organised so as to obtain maximum collaboration between the different disciplines, engineers worked alongside chemists and physicists in a group consisting of as many as 60 scientists of different levels and status.

Natta was the architect and dealt with all things which were to be done, or had to be, or could be done. In scientific matters he favoured experiment rather than theory, facts rather than hypotheses and relied very much on his exceptional intuition. In all these matters he combined the dedication of the pure scientist with the practical logic of the engineer.

About 1956, Natta developed the symptoms of Parkinson's disease. He accepted his illness as a fact of life and tried to continue as though it was not there. His wife and colleagues were a great help to him at this time, and when he received his Nobel Prize from the King of Sweden in 1963, he was supported by his son Guiseppi and his Nobel Lecture was read by a colleague. He gave up work finally in 1973 and lived near his daughter Franca in complete privacy.

Away from his laboratory he was a keen nature lover, and an active mountain climber. His main hobby was collecting fossils, which he successfully displayed in his home in Milan. Another hobby which he pursued for many years was collecting wild mushrooms and he had an extensive knowledge of edible fungi.

Those who knew Natta well attest to his brilliance of mind and exceptional capacity for work. He was a quietly dressed, soft spoken man of short stature and showed courtesy and consideration to visitors from all over the world who came to Milan, either out of scientific interest, or out of interest in the practical and industrial development of his discoveries. His work was internationally recognised by awards in many countries, and he was co-winner with Karl Ziegler of the 1963 Nobel Prize for Chemistry for his work on olefin polymers.

C.E.H. Bawn

<sup>1</sup> *J. Obit. Not. Fell. R. Soc. Lond.* **21**, 569-584 (1975).