

# China Achieves World's First Total Synthesis of Crystalline Insulin

Guided by Mao Tse-tung's thought, Chinese scientists after more than six years of hard work have won the "world championship" for their country in this field of theoretical research. This brilliant and significant achievement marks a giant stride forward in man's great effort to unveil the secrets of life and provides powerful new evidence for the materialist-dialectical theory of the origin of life.

**T**OTAL synthesis of biologically active protein — crystalline insulin — has been achieved by Chinese scientific workers for the first time in the world, after strenuous efforts over a period of six years and nine months.

This outstanding scientific achievement represents yet another great stride forward in man's quest to understand life and unveil its secrets. It ushers in the era of synthetic proteins. It is a striking victory in the field of theoretical research won for the country and people by Chinese scientific workers in their magnificent effort to scale the highest peaks of science and catch up with or surpass the most advanced world scientific levels, an effort led by the Communist Party and under the great red banner of Mao Tse-tung's thought.

A special committee organized by the State Scientific and Technological Commission, after investigating the achievement, has given a unanimous verdict declaring: A comprehensive examination of the plans for the synthesis of insulin, the experimental methods employed, the original data and the logical deductions shows that the totally synthesized crystal obtained is crystalline bovine insulin. This is the

world's first synthesized crystalline protein with biological activity and the largest biologically active natural organic compound ever to be synthesized. The data on the experiments are detailed and reliable, and the indices of the analyses and determinations are complete.

It adds: In its research into the synthesis of insulin, China started from a comparatively weak basis in polypeptide chemistry, but has rapidly surpassed the United States and Western Germany and assumed a leading position in the world. This research project is unique as far as the mapping out of the research programme, the designing of the plans for the synthesis and the development of the techniques of micro-isolation and micro-analysis are concerned.

Protein is part of the material basis of life. All living matter includes protein and also another important form of matter, nucleic acid. Ninety years ago, Engels pointed out: "Life is the mode of existence of protein bodies." He also predicted that "as soon as the composition of the protein bodies becomes known, chemistry will be able to set about the preparation of living protein." But there are many varieties of protein and

they have most complex structures, so it is extremely difficult to achieve a complete knowledge of them. For more than 30 years, scientists of other countries carried on systematic research in this field until, in 1955, the chemical structure of the simplest kind of protein — insulin — was elucidated. It was found to consist of a heneicosapeptide (or "A" chain, which is made up of 21 amino acids) and a triacontapeptide (or "B" chain, which is made up of 30 amino acids) connected by two disulphide bonds. It was clear that the synthesizing of insulin would involve a tremendous amount of complicated work. As late as 1958, the magazine *Nature* (London) predicted that "the possibility that insulin may be synthesized in the laboratory . . . is unlikely to occur for some time to come."

Precisely in that year, however, Chinese scientific workers, inspired by the Party's general line for building socialism and encouraged by the big leap forward that was sweeping the country, set themselves the task of synthesizing insulin. In the following year they succeeded in cleaving natural insulin into its "A" and "B" chains and reconstituting it by combining them again. This gave them a correct technical line of approach in the work of synthesizing insulin. China has led the world at every stage of the research work in this field. It was the first to succeed in the cleavage and reconstitution of natural insulin, the first to obtain crystalline insulin by combining the synthetic "B" chain with the natural "A" chain or by combining the synthetic "A" chain with the natural "B" chain, and the first to obtain totally synthetic crystalline insulin. In the course of their research, the Chinese scientific workers worked out many unique methods and techniques.

Since their first success in totally synthesizing insulin on September 17, 1965, the Chinese scientific workers have produced 57 batches of the synthetic substance, all of them with biological activity. Five of these batches were purified to give crystalline insulin which is the same as natural insulin in crystalline form and biological activity. To compare reported results, products similar to insulin obtained by the United States and Western Germany have a very low activity and no crystal has ever been derived from them.

The synthesizing of insulin is of tremendous significance not only in natural science but also in philosophy. The question of the origin of life has always been a central issue in the struggle between materialism and idealism. The idealists hold that life was "created by God" whereas the materialists hold that it is the result of movement, evolution and development from lifeless inorganic matter over hundreds of millions of years.

The success of the German scientist, Friedrich Wohler, in synthesizing urea in 1828 and thus turning inorganic into organic matter showed for the first time in history that there was no insurmountable barrier between inorganic and organic matter. This was a leap in man's cognition of life, and a heavy blow at idealism. Now the Chinese scientific workers' success in synthesizing protein has provided powerful new evidence

in support of the materialist-dialectical theory on the question of the origin of life. It is another major step forward in man's long journey to unravel the secrets of life, and another heavy blow at idealism.

The fact that the Chinese scientific workers were the first in the world to obtain synthetic crystalline insulin is a great victory for Mao Tse-tung's thought, a great victory for the Party's general line for building socialism.

All through the research work a keen struggle took place between the proletariat and the bourgeoisie, between socialist and capitalist ideas, and between the socialist road and the capitalist road. When the project was first mooted in 1958, certain reactionary bourgeois academic "authorities" called it "adventurism," and a "dream" which not even "world scientific authorities" dared to tackle. In the course of the research they continued to predict success as "remote." When success was achieved, some of them put on airs of "authority" and refused to acknowledge it while others tried to grab the credit. But, led by the Party, Chinese scientific workers followed Chairman Mao's teachings about "breaking with fetishes and superstition and emancipating the mind," and being "engaged in a great and most glorious cause, never undertaken by our forefathers." They courageously shouldered the work, determined to win glory for their country. They took the task not just as a scientific effort but as a political battle. Throughout their research work, they applied the philosophical concepts of dialectical materialism expounded in Chairman Mao's *On Practice* and *On Contradiction*. Having no ready-made formula for the synthesis; they began by sorting out the contradictions, finding the principal one, and arriving at a solution through ceaseless experiment. They learnt whatever they had to learn as they went and set about creating in their work whatever conditions had to be created. They combined daring and courage to think, speak and act with a strict, serious and rigorous scientific attitude. Precisely because of this, the Chinese scientific workers were able to overthrow many established "authoritative" conclusions and win important achievements without precedent in history.

Chairman Mao has said that "the masses have boundless creative power" and that "under the leadership of the Communist Party, as long as there are people, every kind of miracle can be performed." Following out this brilliant thought the scientific workers broke with old conventions in their research work, discarded the practice of relying on just a handful of specialists, and, with firm reliance on the masses, developed communist co-operation between the leadership, the masses and the specialists. Personnel from a dozen organizations took part in the research. Among the scientific workers the total synthesis of insulin is described as a crystallization of collective wisdom and a product of the socialist system.

Thus, through their work in the last six years and more, the Chinese scientific workers have scaled one

of the highest peaks of science and won a "world championship" in science for China. And through this series of experiments, a new detachment of scientific workers has been formed in the field of protein and polypep-

ptide synthesis and a rich stock of experience has been accumulated for the further development of China's scientific research work under the guidance of Mao Tse-tung's thought.

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## Use Mao Tse-tung's Thought to Open The Gate to "The Enigma of Life"

AS far back as 90 years ago, Engels pointed out: "Life is the mode of existence of protein bodies." He also predicted that man would eventually succeed in synthesizing protein. After six years and nine months of hard work, Chinese scientists have now synthesized biologically active protein—crystalline insulin—for the first time in the world.

Engels' prediction of genius has been scientifically proved true first in socialist China under the illumination of the brilliance of Mao Tse-tung's thought. This is a vivid demonstration of the superiority of the socialist system, and a shining victory for the invincible thought of Mao Tse-tung.

The origin of life has always been a question hotly debated between materialism and idealism. Materialism holds that life resulted from hundreds of millions of years of movement, evolution and development of lifeless inorganic matter. However, idealism asserts that life was "created by God." "The enigma of life" has become a most stubborn stronghold in which idealism is entrenched. The success in synthesizing insulin once again proclaims the bankruptcy of idealism, and once again shows the incomparable power of dialectical materialism.

Every step forward in the development of the natural sciences is replete with the struggle between materialism and idealism, between dialectics and metaphysics. A thing as big as the macrocosm or as small as a microcosm, from celestial bodies to elementary particles, everything has its laws of movement for its own contradictions.

Mao Tse-tung's thought is the acme of Marxism-Leninism in our era. It is the most powerful ideological weapon in the hands of the proletariat to transform both nature and society. Mastering Mao Tse-tung's thought enables us to know objective laws, explore the secrets of nature and promote the development of the natural sciences.

Certain bourgeois "specialists" and "scholars" at home and abroad scoffed at the attempt to synthesize insulin, calling it "adventurism," a "pipe dream," and something to be achieved "in the distant future." But Chinese scientific workers, armed with Mao Tse-tung's

thought, had the daring to break away from the religious prejudices of the exploiting classes and to burst asunder the shackles of metaphysics and idealism, freed themselves of the fetishes of outmoded literature and data and of antiquated conventions, boldly carried on experiments, boldly engaged in creative innovations and at length broke open the "sacred precincts" of scientific research.

Comrade Mao Tse-tung has said that matter changes into consciousness and consciousness into matter. This is a great materialist dialectical truth. This truth is at once in conformity with the interests of the proletariat and with the laws of development of nature and society. As more and more scientific and technical workers comprehend this great truth in the course of practice and consciously undertake a profound remoulding of their world outlook, one outstanding achievement after another is being scored in the realm of science and technology in China.

Back in 1957, Comrade Mao Tse-tung said: "If over a period of several five-year plans a fairly large number of our intellectuals accept Marxism and acquire a fairly good grasp of it through their actual work and life, through the practice of class struggle, production and scientific activity, that will be fine. And that is what we hope will happen."

Guided by Mao Tse-tung's thought, we have opened the gate to "the enigma of life" and taken a significant step forward in the long journey of exploring the secrets of nature. Provided that they make greater efforts to study and apply Chairman Mao's works creatively, grasp the powerful ideological weapon of Mao Tse-tung's thought for remoulding the subjective world and transforming the objective world, the masses of the scientific workers will be able to solve many more enigmas of nature and wrest nature's boundless treasures from her in their effort to transform nature. In this way, they will be able to make more and greater contributions to the struggle to catch up with and surpass the world's advanced levels of science and technology and in the cause of the socialist revolution and socialist construction.

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