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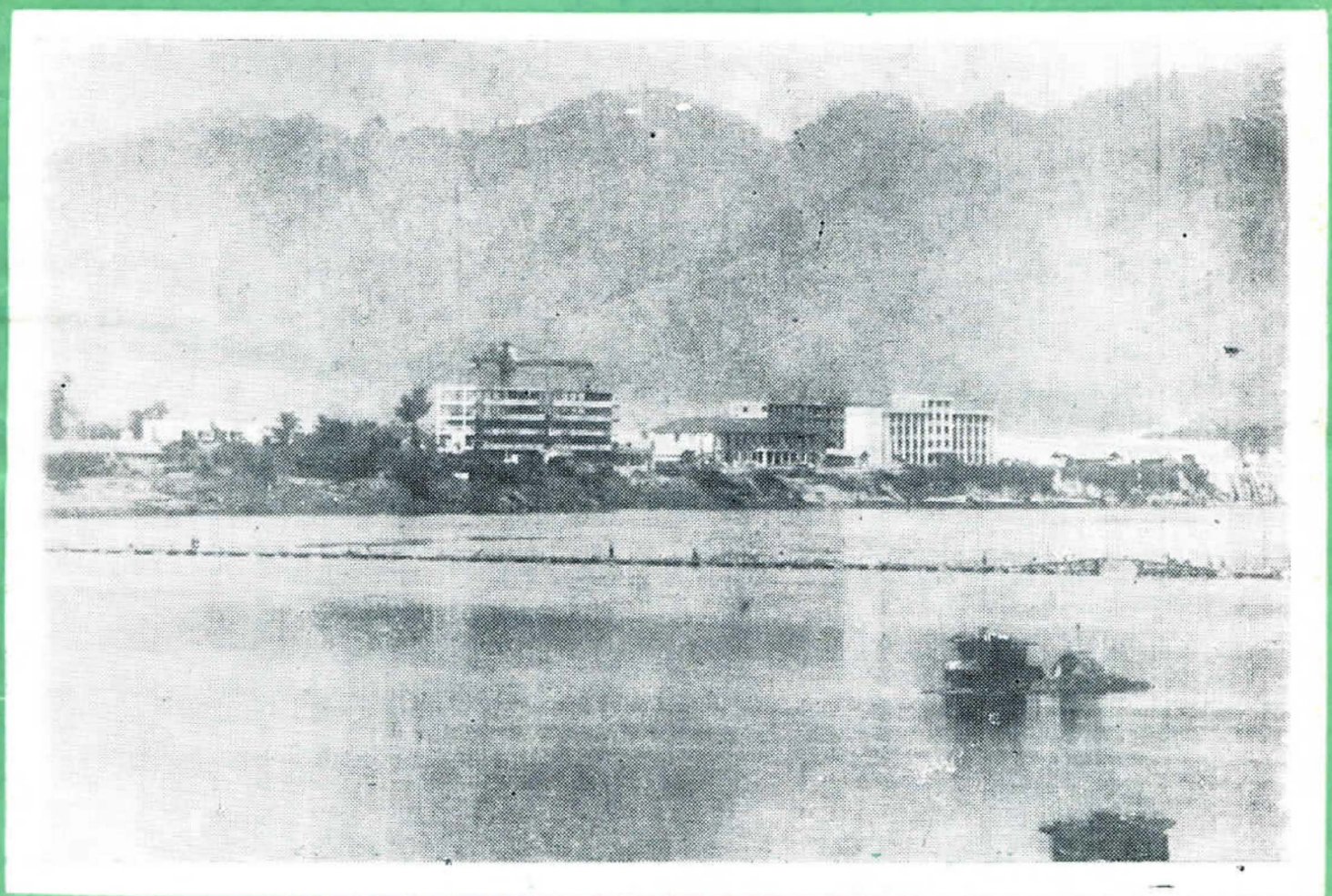

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THE SOVIET–VIETNAMESE SPACE FLIGHT

THE RESEARCH PROGRAMME OF THE FLIGHT

Professor Doctor NGUYEN VAN HIEU

DURING the joint Soviet–Vietnamese space flight which has just been successfully concluded, Vietnamese cosmonaut Pham Tuan and his Soviet colleagues conducted a series of scientific experiments under the Intercosmos programme of the socialist countries. These involved five major scientific problems: study of the atmosphere, biomedical studies, exploration of the earth's natural resources and industrial manufacture in cosmic conditions.

The research and experiments on the atmosphere prepared by scientists of the Soviet Union and other socialist countries aimed to study physical phenomena, particularly the phenomenon of sunlight polarisation in the upper atmosphere, the law governing the behaviour of light when it traverses the atmosphere, and the effects of geographical landscapes on sunlight polarisation on the earth's surface. These experiments require a human presence to operate the on-board systems.

The bio-medical experiments prepared by Soviet and other scientists from socialist countries aimed to study the effects of cosmic conditions on human psychology and physiology. They involved the use of modern equipment jointly designed by member countries of the Intercosmos Programme. Vietnamese scientists had made their own suggestions in this respect but due to lack of time for preparation these suggestions could not be put into practice during this flight.

Among the biological experiments suggested by Vietnamese doctors, the Soviet scientists paid particular attention to the experiment on *azolla pinnata*. Azolla is a high-form plant with a great capacity for reproduction, with very high nitrogen-fixing properties and which contains many non-replaceable amino-acids and many vitamins including B_{12} and some mineral salts. The experiment aimed to probe the possibility of using azolla as an important factor in the creation of a closed cycle ecosystem in outer space, in order to regenerate matter to support human life in flights of long duration. It was actually due to these special properties of azolla that Soviet scientists used very up-to-date equipment and methods for its study. Azolla specimens were supplied by the Vietnam Institute of Sciences. Soviet scientists decided to experiment with azolla in outer space after completing a series of experiments on the ground. Vietnamese scientists will participate in the ensueing experiments on the ground. This will enable Vietnam to continue its studies on azolla with modern methods and equipment, and hence to find suitable measures to develop this resource for agriculture.

The experiments concerning remote sensing of the environment and natural resources of Vietnam were suggested by various scientific and technical institutions in the country. To coordinate the research programme, the Vietnam Commission for Space Research convened a scientific conference in Hanoi in April 1980 with the participation of scientists from the Soviet-Union, the German Democratic Republic and Bulgaria. Apart from photographing the territory of Vietnam by the MKF-6M multispectral photocamera co-produced by the German Democratic Republic and the USSR, and conducting spectrometric and photographic observations of natural objects by the "Spektr-15" spectrometer devised by Bulgaria the cosmonauts also carried out visual observations and took photographs with hand cameras. These experiments are not yet finished and will be carried on by the Soviet cosmonauts Leonid Popov and Valery Ryumin during their long duration flight in space on board the "Salyut 6" orbital station. As well as photographing and observing the territory of Vietnam from outer space the Vietnam Commission for Space Reasearch is also organizing the photographing by the MKF-6M installed on board AN-30 planes to conduct measurements and observations of certain typical regions in Vietnam. The photographs taken from outer space and AN-30 planes will be processed by modern equipment including special computers in the cosmic photo processing rooms of the Soviet Union and other socialist countries. A plan has been worked out to build such rooms in Vietnam in the future. The results of the research on the environment and natural resources will supply important data for basic research and provide a basis for the working out of economic development programmes in Vietnam.

The experiments on industrial processes in outer space codenamed "Ha Long" suggested by Vietnamese scientists were aimed at studying the effect of gravity on the process of crystallisation of some special semi-conducting components. The results obtained during the flight will help find the appropriate method to manufacture high-quality monocrystals in earth-based laboratories in the service of technological development. In view of the inadequacy of conditions in the country for the experiment, the Vietnam Commission for Space Research asked the Soviet Union and the German Democratic Republic to provide facilities for the conduct of these experiments in some research institutes of those countries in cooperation with Soviet and GDR scientists.

The preparations for the experiment were completed before schedule. It was originally planned to carry out two experiments, but six experiments were ready before the flight. In addition, during the preparation for the "Ha Long" experiments, scientists of the Soviet Union, the German Democratic Republic and Vietnam had worked out a new method to determine the distribution of heat in the equipment "Crystal" installed on the "Salyut-6" orbital station for growing monocrystals. They had also cooperated in manufacturing a digital electronic device for carrying out this experiment. This is actually two experiments on cosmic technology processes called "The Imitator". The results of this experiment will be available to all countries members of the Intercosmos Programme. Under the common plan of the Programme the analysis and study of the materials in cosmic conditions will be conducted in the laboratories of the three above-

THE NATIVE VILLAGE OF COSMONAUT PHAM TUAN

QUOC TUAN commune in Kien Xuong district, Thai Binh province, the native land of the first Vietnamese cosmonaut, Pham Tuan, lies on the banks of Tra Ly river. It is a quiet, peaceful village like any other in the Red River delta. It offers the same familiar Vietnamese country scene: verdant bamboo groves, rows of areca trees with their crests swaying in the sky, discreet banana gardens and green rice paddies surrounding the village. On windy evenings the mellow music of the bamboo kites enhances this sense of peace and tranquility. Pham Tuan himself likes to recall that in his childhood kite flying was one of his hobbies after a day of strained study or hard work.

Seeing the happy life of the village today one could hardly imagine that the famine in 1945 took a toll of over one-third of its population. Whole families died and there were no able-bodied persons left to bury the dead. This tragedy has left its mark on the joyless faces of the aged people there today. Pham Tuan was born to Pham Cat by his second wife, Vu Thi Nhon, both having lost many of their loved ones during the great famine. Tuan has a sister, Pham Thi Suu, and a brother, Pham Niet.

His native village lies in one of the lowest areas of Kien Xuong district where only one crop in summer could be grown. In the rainy season starting from July or August the fields were several feet under water. Words alone cannot describe the plight of the local population, expressed in this local saying: "Living, our skin is immersed, dead, our bones are under water." Understandably enough, the more miserable their life was, the more the peasants of Thai Binh supported the revolution. During the anti-French war of resistance the French erected a post right in the village to tighten their control, and still did not succeed in stamping out the revolutionary movement. The self-sacrificing example of Tran Duoc, one-time leader of the resistance and administrative committee chairman of the commune, who had rather let the enemy burn him alive than give away the cadres of the resistance, further aroused the patriotic flame of the villagers. Support for the resistance grew stronger and stronger. People gave their support and their savings, accepting any sacrifice and hardship, resolved never again to return to slavery. This spirit of insubordination has been a proud tradition of Quoc Tuan commune, and one to which Pham Tuan's family made a worthy contribution. Pham Kien, Tuan's half-brother, joined the army during the hardest days of the resistance and died a hero while defending his sacred homeland. After burying his beloved son, the father slipped through the enemy encirclement and returned to the village where he kept up a calm appearance. Asked by the villagers about Pham Kien, he replied: "He has recovered from an illness and now his unit has moved elsewhere." He feared that to tell the truth would scare the villagers and adversely affect the movement of voluntary enrolment in the army. His courage and devotion to the revolution has had deep influence on his other sons, Pham Tuan in particular.

Following the victory of the anti-French resistance, life in Quoc Tuan remained hard due to the poverty of the soil. But things began to improve with the founding of the first agricultural cooperative together with the digging of irrigation canals which made it possible to introduce new strains of rice and to apply methods of intensive farming. The face of the commune changed year after year: no more flooding in the rainy season and the fields were covered with crops all the year round. Apart from two rice crops, some of the fields are grown to an additional subsidiary crop in winter. With the constant increase in rice production the life of the farmers also improved markedly. From being a food deficient co-op Quoc Tuan has become self-sufficient in food and has been able even to sell some surplus rice to the State after fulfilling its food contribution quota.

Before, in the Vietnamese countryside, a brick house and a jackfruit tree were symbols of wealth which were usually the privilege of the landlord class. But in Quoc Tuan in those days even the landlords did not have brick houses. Today, almost 80% of the families already have brick houses, tea beds, orange groves and fish ponds. In Dac Chung village in particular where Pham Tuan was born, virtually every house is now brick-walled and hardly a mud or bamboo house can be found.

Whereas in the past the whole commune had not a single hospital nurse or classroom, today Quoc Tuan has a health station staffed with a doctor, two assistant-doctors and many nurses, twelve crèches, four kindergartens with twelve classrooms for children of three different age groups: three, four and five year-olds. The commune also has a first-and second-level general education school large enough to accommodate all children of school-going age.

THAO LAM

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mentioned countries over a period of one year before a general conclusion is reached.

After one week of work in outer space, the Soviet-Vietnamese international crew had successfully completed the scientific research programme of the flight. The successful completion of preparations for the experiments in outer space during the recent flight marks another step forward in scientific research in Vietnam. This is also a fine result of the assistance provided by scientists from the Soviet Union and other socialist countries for the development of science in Vietnam.

The flight has finished but the programme of scientific experiments will continue. It requires many more efforts from Vietnamese scientific and technical workers. After all, Vietnam's participation in the scientific programme of the Soviet-Vietnamese space flight is only the beginning of a new scientific programme, that of applying the results of space research to the development of the national economy, and the use of outer space for peaceful purposes in Vietnam.