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**ON THE 30<sup>th</sup> ANNIVERSARY OF THE UKRAINIAN ANTARCTIC STATION "AKADEMIK VERNADSKY"**

This year marks the 30<sup>th</sup> anniversary of a landmark event in the history of Ukrainian science: the moment when the Ukrainian flag was raised on Galindez Island in Antarctica and the British Faraday Station officially became the Ukrainian Akademik Vernadsky Station. This transition was not merely a symbolic assertion of statehood at one of the most remote points on Earth. It represented a decisive step toward establishing Ukraine as a respected and responsible member of the global scientific community. On 6 February 1996, Ukraine entered a select group of nations conducting systematic, long-term research in Antarctica. Although the station was transferred by the United Kingdom free of charge, its true value lay in the confidence placed in Ukrainian science — its capacity, its professionalism, and its commitment to international scientific standards.

Since that time, Ukrainian researchers have worked continuously on the icy continent, demonstrating that science transcends borders and persists even in the face of formidable challenges. The National Antarctic Scientific Center of the Ministry of Education and Science of Ukraine (NASC) coordinates these efforts, overseeing research planning, expedition logistics, team formation, and the integration of diverse scientific disciplines. This coordinated approach enables Ukrainian scientists to combine field observations with laboratory analyses and to participate actively in international

research initiatives. Such activity has acquired particular significance today, as Ukraine continues to resist full-scale Russian aggression. Despite the war, the 31<sup>st</sup> Ukrainian Antarctic Expedition has commenced its mission. This is not only a testament to scientific dedication — it is an expression of resilience, responsibility, and the determination to think about the future even in the most difficult circumstances.

A meaningful contribution to Antarctic research is made by the staff of the Institute for Problems of Cryobiology and Cryomedicine of the NAS of Ukraine (IPCC). In March 2016, IPCC and NASC signed an Agreement on Scientific and Technical Cooperation, initiating a decade of joint medical-physiological and biological studies in Antarctica.

Dr Dmytro Lutsenko, researcher of the Cryophysiology Department, participated in the 21<sup>st</sup> Ukrainian Antarctic Expedition (2016–2017). During this wintering, there were launched studies on human adaptation to cold and on the effects of altered light regimes on the sleep of overwintering personnel. For the first time worldwide, a full-year continuous sleep monitoring program was conducted throughout the entire wintering period using portable trackers that recorded motor activity and cardiac parameters during sleep. The results revealed that sleep disturbances are largely individual, with their peak occurring in the middle of the Antarctic winter, when natural light is almost entirely absent.

Reference: Petrenko OYu. On the 30<sup>th</sup> anniversary of the Ukrainian Antarctic station "Akademik Vernadsky". *Probl Cryobiol Cryomed.* 2026; 36(1): 3–4.

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Field data also confirmed, for the first time, the existence of two distinct types of autonomic regulation that may develop during prolonged wintering — likely reflecting two different physiological strategies for responding to acute cold stress, previously identified under controlled laboratory conditions.

Equally important are the studies of extremophilic organisms. Dr Anton Puhovkin, who participated in the 26<sup>th</sup> Ukrainian Antarctic Expedition (2021—2022) and in seasonal expeditions from 2023 to 2026, together with colleagues investigated Antarctic lichens and other autotrophs. The team demonstrated how these organisms withstand extremely low temperatures while maintaining photosynthetic activity. Using chlorophyll fluorescence, they identified interspecies differences in frost tolerance and confirmed the ability of some lichens to enter a "glassy" state without ice formation. In addition, Dr D. Lutsenko discovered that the biochemical composition of the blood of certain Antarctic fishes near the Akademik Vernadsky Station differs markedly in osmolyte concentrations from the same species inhabiting warmer waters — a phenomenon widely regarded as a specific adaptation to life in subzero marine environments.

These findings have implications not only for biology but also for medicine, cryotechnology, and even future space exploration. Long-term residence in isolated polar stations is increasingly viewed as a model for studying extended space missions, including potential expeditions to the Moon or Mars. More broadly, Antarctic research contributes to understanding global climate processes, the adaptation of living organisms to extreme environments, and the limits of life in conditions once thought uninhabitable. Such knowledge forms the foundation for decisions that shape the future of our planet.

Today, the Akademik Vernadsky Station stands not only as a scientific outpost but also as a symbol of Ukraine's endurance and international cooperation. It is a place where daily work under conditions of cold, isolation, and limited resources becomes research of global significance.

We extend our sincere congratulations to all polar explorers, scientists, and colleagues on this remarkable anniversary. May the coming decades bring new achievements, strengthen international collaboration, and further affirm Ukraine as a nation that advances the future through science — even at the edge of the world.