

EDITORIAL

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PREFACE

Dear Readers, We are pleased to present the latest issue of our scholarly journal, which brings together the results of interdisciplinary research aimed at understanding the historical stages in the development of science and technology, technological innovations, and their impact on society. This publication continues our commitment to fostering dialogue between historians, engineers, scientists, and cultural theorists, offering a platform for rethinking the intersections of knowledge systems across time and disciplines. By highlighting both well-established and emerging fields of inquiry, we strive to demonstrate the enduring relevance of historical analysis in addressing contemporary challenges.

This issue reflects our belief that science and technology are not only engines of progress but also complex cultural phenomena. Each article invites readers to explore how inventions, practices, and theories were shaped by – and in turn shaped – the societies in which they emerged. Through critical engagement with sources, methods, and narratives, we seek to illuminate the human dimension of scientific and technical change, encouraging reflection on its ethical, social, and philosophical implications.



The central focus of this issue is a fundamental study devoted to the work of Ukrainian geneticist Oleksii Sozinov (1930–2018), one of the key figures in 20th-century agricultural science. The article explores the development and implementation of phytotron technologies in plant breeding at the All-Union Selection and Genetics Institute (now the National Center for Seed Science and Variety Research). The authors not only reconstruct Sozinov's scientific career but also introduce a new array of archival sources into academic circulation, allowing for a reassessment of the innovative methods used to increase crop yields. This study convincingly demonstrates that an interdisciplinary approach – combining microhistory, source studies, history of science, and agrotechnology – can reveal the contributions of individual scientists to global transformations.

The theme of technological evolution continues with a timely study on the development of supercharging systems for piston aircraft engines. The authors meticulously reconstruct the chronology of these technologies, from the earliest days of aviation, focusing on technical innovations that significantly improved engine altitude performance. By combining technical analysis with historical context, the study offers insight not only into engineering features but also their impact on military aviation in the first half of the 20th century – a rare fusion of engineering precision and historical depth.

Another remarkable example of a technological breakthrough that influenced the course of history is radar technology during World War II. The related article discusses not only engineering solutions (such as Chain Home, Freya, SCR-270) but also the strategic role of radar in crucial battles including the Battle of Britain, the Atlantic campaign, and the Pacific theater. The authors also examine how the postwar development of radar influenced air defense systems, meteorology, and modern navigation. This analysis shows that technical innovation can become a bifurcation point in history – impacting both military strategy and civil progress.

The history of medicine is represented by an engaging comparative study of medieval Georgian medical culture and European practices. Special attention is given to the treatise *Ustoro Karabadini*, which reveals the influence of Greco-Roman traditions on Georgian medicine. The article explores the four humors theory, dietary advice, childcare approaches, and seasonal diagnostics, offering a comprehensive view of the scientific culture of the time. It also highlights parallels between agricultural traditions, viticulture, and medical knowledge in Georgia and Europe, showing deep integration of cultural knowledge with natural medicine.

A completely different dimension of scientific progress is reflected in the review of the evolution of forensic bloodstain analysis. From visual inspection to the use of AI, this evolution mirrors the broader trend of science digitalization. The article traces how modern methods – such as spectroscopy, hyperspectral imaging, chromatography, and machine learning algorithms – enable accurate determination of stain age, opening new frontiers for forensic science. Despite these advances, the authors emphasize ongoing challenges such as standardization, environmental factors, and substrate differences. This study stands at the intersection of bioinformatics, analytical chemistry, and law.

Among contemporary issues, cybersecurity receives particular attention. The article on computer viruses provides a historical overview from the legendary Morris Worm to WannaCry, showing how technical threats became the subject of scientific inquiry. The focus is on the evolution of countermeasures: from signature-based antivirus software to machine learning, behavioral models, and deep neural networks. The study underscores the dual nature of this field: increasing complexity of threats alongside constant improvements in AI-based defense. The authors argue that the future of cybersecurity lies in the synthesis of historical experience and technological adaptability.

In the following article, the Authors presents an interdisciplinary study combining historical analysis and experimental research to examine the vulnerability of military drones made from carbon fiber-reinforced polymer (CFRP) to laser destruction. It explores the historical development of CFRP use in military drones, highlighting its adoption due to the need for lightweight, durable, and radar-evading materials, influenced by geopolitical and technological factors. Concurrently, the study investigates the rise of high-energy laser systems as precise countermeasures against fast, small, and stealthy drones, driven by concerns over swarm attacks and limitations of traditional defenses. Experimentally, CFRP samples were tested under controlled laser radiation to identify damage mechanisms and energy thresholds causing material failure. By integrating historical context with laboratory results, the article offers a comprehensive view of how past material choices have created current vulnerabilities and how modern laser weapons exploit these weaknesses, advancing more effective counter-drone strategies for present and future military applications.

This article examines the design, fabrication, and long-term operation of Kyiv's Evgeny Paton Bridge, the world's first all-welded highway bridge completed in 1953. Named after welding pioneer Evgeny Paton, the bridge marked a key advance in civil engineering and Soviet postwar reconstruction, showcasing the shift from riveted to welded structures through innovations in metallurgy, structural analysis, and automatic submerged arc welding. Using archival and technical sources, the study places the bridge within its political and economic context, highlighting its dual role as functional infrastructure and a symbol of Soviet scientific progress. The article reviews over seven decades of operational experience, focusing on the bridge's durability, maintenance, and influence on later engineering worldwide. Serving as a living laboratory, the Paton Bridge demonstrates the practical application of scientific research in welded steel structures and remains relevant to modern infrastructure and engineering education.

A study of the electrification of Tashkent from 1914 to 1918 presents significant historical interest. Against the backdrop of geopolitical instability and the colonial approach of the imperial center, the development of energy infrastructure in the region appears as an attempt at modernization despite unfavorable conditions. While the number of power stations increased, a lack of industrial support and investment outflow hindered further progress. The analysis reveals how energy policy influenced the region's economic potential and exposed untapped infrastructural resources.

Traditional technologies that have retained their relevance are highlighted in the article on wood-fired kiln ceramics. This topic offers a fresh interpretation of

technology as a form of aesthetic and emotional experience. The authors trace the evolution of the practice from utilitarian craft to a philosophy of fire interaction. An analysis of kiln types, firing regimes, ash impact, and temperature variations helps explain why this technique continues to inspire contemporary artists.

A fascinating socio-technical case study is the history of automotive engineering in Francoist Spain. Through the lens of the *Revista de la STA*, researchers uncover the image of the engineer as a bearer of technical progress within an authoritarian state. Technological breakthroughs described by engineers themselves are presented as part of a collective imagination – a space where technology, the state, and professional pride coexist in a complex dynamic. This study demonstrates how cultural history shapes the history of technology.

Finally, the issue concludes with a study on the emergence of cinema as a technical and social phenomenon. It captures the transition from optical illusions and mechanical devices to digital technologies and virtual reality. The authors examine not only the technical foundations of cinema-mechanics, vision physiology, photochemistry – but also its cultural contexts: fairs, cinemas, and the public consumption of visuality. Cinema emerges as both a product of scientific knowledge and social demand, a communicative platform, and a technological system.

Taken together, this issue is a vivid illustration of the current state of historical and scientific studies. The articles transcend traditional disciplinary boundaries, rethink the human role in technical transformations, and emphasize the importance of local contexts in global processes. A shared feature across all contributions is the blend of historical depth, source-based rigor, and interpretive boldness. We are confident that these articles will be of value to researchers, educators, students, and all who are interested in the development of science, technology, and culture.

We also wish to express our sincere gratitude to the authors, reviewers, and editorial team whose dedicated work made this issue possible. Their intellectual contributions and commitment to scholarly excellence ensure that each article meets the highest academic standards. We are equally grateful to our readers, whose interest and feedback continue to inspire us to expand the scope and depth of our publication.

As we turn the pages of this issue, we invite you to join us in exploring the intricate connections between past innovations and present realities. We hope that these studies will not only inform but also provoke new questions, spark dialogue, and encourage further research. May this issue serve as a valuable resource and a catalyst for deeper understanding of the ways in which science, technology, and culture shape – and are shaped by – each other through time.