

## Brief information about the project

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| Name of the project           | <b>AP26100125</b><br><b>Investigation of the potential genotoxicity and mutagenicity of microplastics using in vivo test systems</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Relevance                     | The project is aimed at investigating the genotoxic, mutagenic, and toxic effects of microplastics derived from widely used plastic materials such as polyethylene terephthalate (PET), polypropylene (PP), and polystyrene (PS). The study encompasses the effects of microplastics of various sizes and compositions on living organisms, thereby enabling an assessment of their potential hazard to the biota of diverse ecosystems as well as to human health. The objective of the proposed research is not only to identify the genetic risks associated with microplastic exposure, but also to establish safe exposure levels for the purpose of further pollution regulation. At present, microplastic pollution has become one of the most pressing environmental threats of our time. Once released into ecosystems, these particles may exert adverse effects on human health and the environment; however, their exact consequences for health and genetic stability remain insufficiently understood. The project is therefore focused on identifying these risks and developing scientifically grounded recommendations for the regulation of microplastic pollution. |
| Purpose                       | The Project goal is to examine the genotoxic and mutagenic activity of microplastics derived from commonly used plastics (polyethylene terephthalate, polypropylene, polystyrene) to assess the hazard these microplastics pose to environmental entities and to extrapolate the experimental findings for potential implications in human health.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Objectives                    | <ul style="list-style-type: none"> <li>• to investigate the mutagenic, genotoxic, and toxic activities of microplastics derived from commonly used plastic types, including polyethylene terephthalate (PET), polypropylene (PP), and polystyrene (PS).</li> <li>• to characterise the structural and functional changes in various internal organs of laboratory animals exposed to microplastics of differing composition and size.</li> <li>• to identify factors influencing the genetic activity of microplastics, such as particle size, composition, and exposure duration.</li> <li>• to determine the Derived No (Minimal) Effect Level (DN(M)EL) of various types of microplastics using specialised software (BMDS).</li> <li>• to assess the genetic risk microplastics pose to biota and human health.</li> </ul>                                                                                                                                                                                                                                                                                                                                                        |
| Expected and achieved results | <ul style="list-style-type: none"> <li>• The mutagenic, genotoxic, and toxic activities of microplastics derived from commonly used plastics (polyethylene terephthalate (PET), polypropylene (PP), polystyrene (PS)) will be determined.</li> <li>• Structural and functional changes in various internal organs of laboratory animals exposed to microplastics of different compositions and sizes will be characterised.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

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|                                                                                                                                    | <ul style="list-style-type: none"> <li>• Key factors influencing the genetic activity of microplastics (particle size, composition, exposure time) will be identified.</li> <li>• The Derived No (Minimal) Effect Level (DN(M)EL) for various types of microplastics will be established.</li> <li>• Genetic risks posed by microplastics to biota and humans will be assessed.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Research team members with their identifiers (Scopus Author ID, Researcher ID, ORCID, if available) and links to relevant profiles | <p>Lovinskaya Anna – Scientific supervisor, Leading researcher<br/>Scopus Author ID – 55701592700<br/>(<a href="https://www.scopus.com/authid/detail.uri?authorId=55701592700">https://www.scopus.com/authid/detail.uri?authorId=55701592700</a>), ResearcherID - N-6536-2014<br/>(<a href="https://www.webofscience.com/wos/author/record/1010361">https://www.webofscience.com/wos/author/record/1010361</a>);<br/>ORCID - 0000-0001-7012-2415,<br/>Kolumbayeva Saule – Chief Researcher, Scopus Author ID – 22134772600<br/>(<a href="https://www.scopus.com/authid/detail.uri?authorId=22134772600">https://www.scopus.com/authid/detail.uri?authorId=22134772600</a>),<br/>ResearcherID - N-8528-2014<br/>(<a href="https://www.webofscience.com/wos/author/record/1330090">https://www.webofscience.com/wos/author/record/1330090</a>);<br/>ORCID - 0000-0003-0835-3655,<br/>Shalakhmetova Tamara – Chief Researcher, Scopus Author ID – 6603622408<br/>(<a href="https://www.scopus.com/authid/detail.uri?authorId=6603622408">https://www.scopus.com/authid/detail.uri?authorId=6603622408</a>)<br/>ResearcherID - N-9691-2014, IHP-5672-2023<br/>(<a href="https://www.webofscience.com/wos/author/record/43435654">https://www.webofscience.com/wos/author/record/43435654</a>,<br/><a href="https://www.webofscience.com/wos/author/record/N-9691-2014">https://www.webofscience.com/wos/author/record/N-9691-2014</a>), ORCID - 0000-0001-6724-9810<br/>Suvorova Maria – Leading researcher, Scopus Author ID – 57196243692<br/>(<a href="https://www.scopus.com/authid/detail.uri?authorId=57196243692">https://www.scopus.com/authid/detail.uri?authorId=57196243692</a>),<br/>ResearcherID - HLX-7146-2023<br/>(<a href="https://www.webofscience.com/wos/author/record/38127360">https://www.webofscience.com/wos/author/record/38127360</a>);<br/>ORCID - 0000-0001-6505-5561,<br/>Kalimagambetov Aitkali – Leading researcher, Scopus Author ID – 14014049700<br/>(<a href="https://www.scopus.com/authid/detail.uri?authorId=14014049700">https://www.scopus.com/authid/detail.uri?authorId=14014049700</a>),<br/>ResearcherID - CXQ-9025-2022<br/>(<a href="https://www.webofscience.com/wos/author/record/9619431">https://www.webofscience.com/wos/author/record/9619431</a>),<br/>ORCID - 0000-0002-8944-1560<br/>Yrgynbayeva Shynar – Senior Researcher, Scopus Author ID – 58988528200<br/>(<a href="https://www.scopus.com/authid/detail.uri?authorId=58988528200">https://www.scopus.com/authid/detail.uri?authorId=58988528200</a>),<br/>ResearcherID - GJJ-8658-2022<br/>(<a href="https://www.webofscience.com/wos/author/record/31199042">https://www.webofscience.com/wos/author/record/31199042</a>)<br/>Mamedova (Fatkhutdinova) Yekaterina – Junior Researcher,<br/>ORCID - 0000-0001-8411-9989<br/>Khalmatova Renata – Research Assistant</p> |
| Usage                                                                                                                              | <p>The data obtained will make it possible to formulate evidence-based recommendations for environmental genetic monitoring and for the development of preventive and environmental protection measures, as well as to use them in further studies aimed at improving sanitary and hygienic standards.</p> <p>The results obtained may be applied in medical institutions involved in the development of sanitary and hygienic regulations, as well as in various scientific and educational institutions engaged in the training of specialists in sanitation and hygiene, biology, environmental chemistry, and ecology.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

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|                                              | The results may also be used by specialists in the fields of biology, chemistry, hygiene, and ecology.                                                                                                                                                                                                                                                                                             |
| Priority compared to real-world alternatives | Fundamental research                                                                                                                                                                                                                                                                                                                                                                               |
| List of publications with links to them      | Lovinskaya A.V., Kolumbayeva S.Zh., Khalmatova R.R. Phytotoxic Effects of PET Microplastics on Barley Seed Germination //International Conference on Microplastics and Urban Plastic Pollution Studies (ICMUPPS - 25). - 11th Dec 2025. - George Town, Malaysia. – <a href="https://academicresearchlibrary.com/abstract-detail/4041">https://academicresearchlibrary.com/abstract-detail/4041</a> |
| Patents                                      | no                                                                                                                                                                                                                                                                                                                                                                                                 |
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